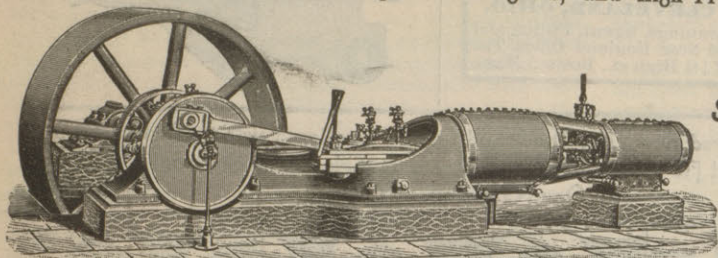


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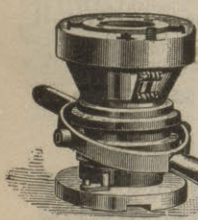
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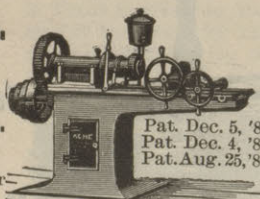


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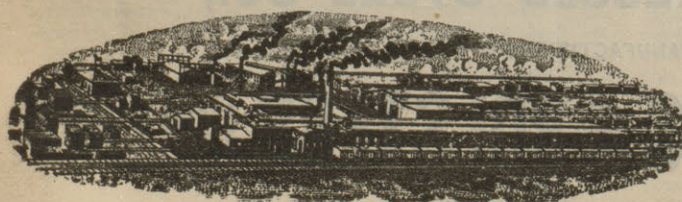
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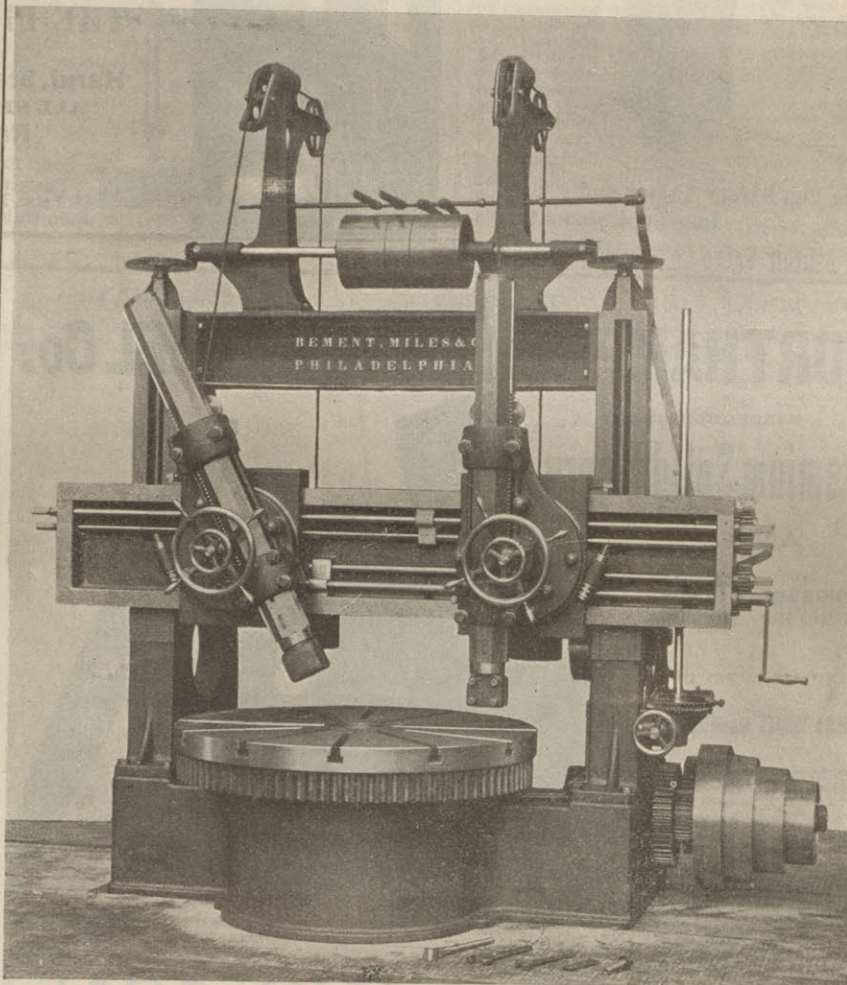
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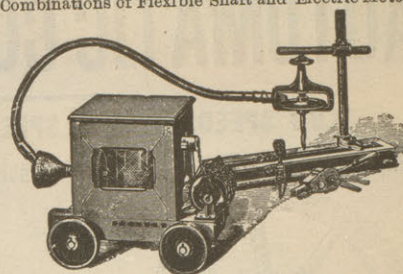
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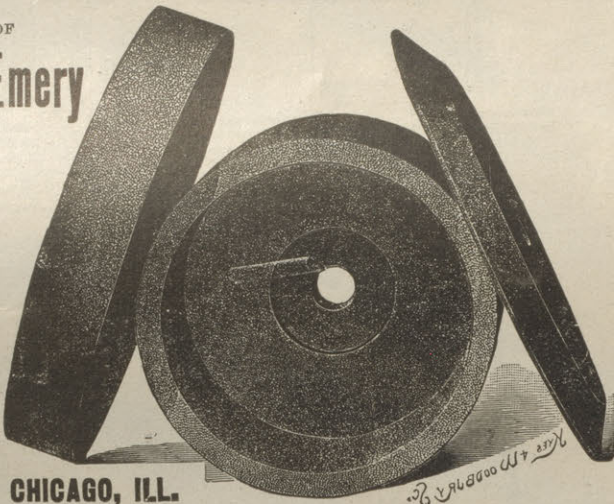
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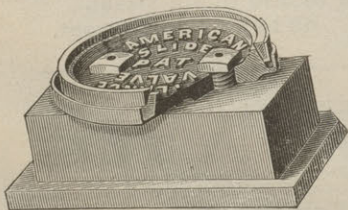
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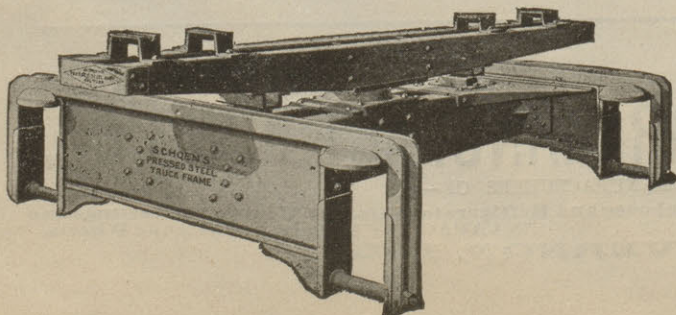
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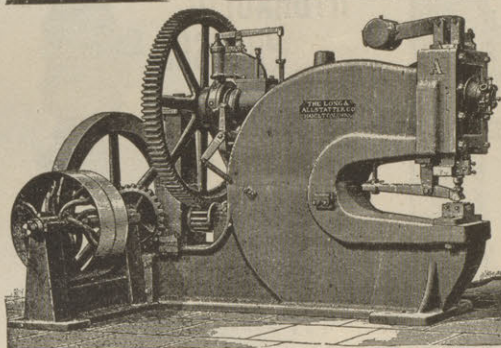
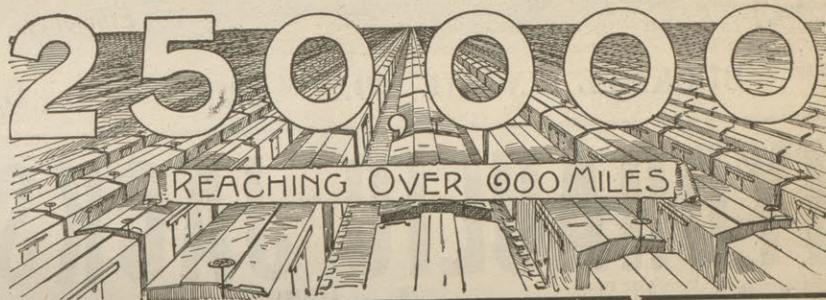
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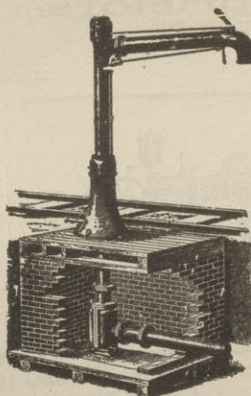
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# THE RAILWAY REVIEW

XXXVI.

APRIL 4, 1896.

No. 14.

**PREVENTED DESTRUCTION OF TOOLS IN A BURNING BUILDING.**—Reports were current in the railroad papers that the Mexican International Railroad had lost \$200,000 through the burning down of its repair shops at Piedras Negras, Mex. The impression was that the fine equipment of machine tools was completely ruined. Locomotive Engineering says it now turns out that the damage is not more than one-tenth of what it was calculated to be. The prevention of total loss was due to a highly bold and intelligent action on the part of Mr. Wm. Jennings the superintendent of the mechanical department. The fire had got well started before the fire department was ready to begin operations, and Mr. Jennings saw that it was impossible to save the buildings, which were of wood and very dry. So he gave orders that no water should be thrown upon the fire. He got together a good force of laborers, and as soon as they could get near enough to the buildings they were set to work shoveling sand and earth upon the glowing embers, care being taken to smother the tools. The non-conducting materials thus applied made the tools cool slowly, and very few of them were found to be warped when they were cleaned up. A temporary shop was erected and nearly all the tools worked as well as they did before the fire. If the usual practice had been followed of pouring water upon the fire, most of the tools would have been ruined.

**PAINTS FOR IRONWORK.**—An account of some interesting researches on the value of paints for ironwork, made by Professor J. Spennrath, has recently been published in the *Deutsches Bauzeitung*. As one result of these, Prof. Spennrath concludes that none of the metallic oxides commonly used combine chemically with linseed oil. The drying process depends exclusively on an absorption of oxygen by the oil, which is facilitated by the presence of the pigment in a pure mechanical way. The value of the different pigments used varies. Thus zinc white when used for outside work, rapidly swells to double its previous volume, owing to the absorption of carbonic acid gas and water. Sulphuretted hydrogen will cause red or white lead to act in a similar way, but, when pure, Prof. Spennrath considers these two latter pigments satisfactory. Carbon paints are very stable, as is heavy spar, but the covering power of the latter is small. In order to test the relative durability of various paints, sheets of zinc were coated with a number of different kinds. The zinc was then dissolved away by acid, leaving a film of paint. All these films, it was found, could be destroyed by the action of dilute nitric or hydro-chloric acids, whilst the vapors of sulphuric and acetic acids acted similarly. Alkaline fluids and gases also destroyed the paint rapidly. Pure water was found to be more injurious than salt water, and hence the destructive action of sea water is to be attributed mainly to the mechanical effects of wash. Hot water was found to act more rapidly than cold. The most important discovery made was, however, the great influence of temperature. Films similar to those already described completely lost their elasticity and became brittle when exposed to a temperature of 203 deg. Fah. There was at the same time a large contraction. Similar effects are produced by prolonged exposure to considerably lower temperatures. Blistering he finds to be due to the inner coat of paint being so thick that it has not hardened thoroughly before the second coat is applied.

**UTILIZATION OF IRON ORE DUST.**—It is stated that an addition will soon be built to the Illinois Steel Company's plant at Bay View for the utilization of the iron ore dust, or fine ore which up to the present, in the process of blasting and smelting the iron ore, has gone to waste. The process of utilizing this ore has been invented by M. Nirdlinger of Milwaukee, who is the president of the Acme Mineral Nugget Company which was recently incorporated at Camden, N. J., and in which several Philadelphia and Cleveland parties are interested. The company furnishes the machinery for the process and sells to blast furnaces the right to use the process. The daily waste in ore at the different works of the Illinois Steel Company is from 350 to 450 tons, and by using the process for collecting and compressing the fine ore invented by Mr. Nirdlinger the company will avail itself of every pound of this waste ore, which will constitute a considerable saving.

**WHAT WE ARE COMING TO IN TELEGRAPHY.**—With a view to ascertaining the highest speed at which telegraphic characters can be legibly recorded, Mr. P. B. Delany, in some recent experiments, succeeded in transmitting by his machine system 8,000 words per minute, and obtained a plain reproduction of the signals by electrolysis on the chemically prepared receiving tape. The circuit was an artificial one of 650 ohms, 2.95 microfarads, and the electromotive force was 115 volts. This is about the equivalent of an ordinary telegraph line of 100 miles in length, or, say, New York to Philadelphia. At this speed the perforated tape upon which the messages were composed passed through the transmitting machine at the rate of 27½ ft. per second, and the impulses comprising the letters traveled at the rate of 2,500 per second or 133 words, equal to six ordinary telegrams of 22 words each in a single second. At this rate the next few years must bring about great changes in methods of correspondence, and, inevitably, a large portion of the ninety millions now annually expended on wheel transportation of the mails will be diverted to the telegraph. Why not asks the Electrical Engineer?

**DITCHING TRACK.**—Speaking of ditches and ditching, says Jerry Sullivan in *Roadmaster and Farmer*, brings to mind a fault common to nearly all work train foremen. The object of ditches alongside of the track is mainly to

furnish a channel through which the water may flow away from the track as fast as it gathers. But another consideration, almost as important, is to get the ballast in the track drained, and the roadbed dry as soon after it rains as possible. In order to accomplish this successfully, a ditch should have a depth of at least 18 in. below the bottom of at ties. But very few ditches are dug to this depth. To one standing in the center of the track or on a car of dirt in a work train, they look deep enough, but if a level board is used, one will be surprised to find the ditch only from 6 to 10 in. below the ties. Of course such a ditch will not drain the track to a depth sufficient to make a good foundation for the ties. But this rarely occurs to a work train foreman. He will keep a portion of his gang steadily at work shoveling and shaping and scraping the sides of the cut to a line mathematically exact from top to bottom, and from end to end. Such a smooth appearance might lead one to believe that they had been sand-papered. The ditches are given the same care, and owing to the slight incline present the appearance, when finished, of elegant promenades on either side the track. This is poor practice, and the result cannot be called ditches.

**CHINESE LABOR AND WAGES.**—The United States consul at Shanghai has made a report to the state department in which are presented in detail the amounts of wages paid in that country for skilled labor. The sums are stated in American currency; the wages given include food except in cases where asterisks are used:

Description.	Per Day.	Per Month.
Blacksmith.....	\$0.13	.....
Brassworker.....	.16	.....
Barber.....	.03	.....
Bootmaker—		
Native.....	.10	.....
Foreign.....		\$5.28
Bamboo cabmaker.....	.11	.....
Bricklayer.....	.10	.....
Compositor—		
Native.....		5.28
Foreign.....		7.92
Carpenter.....	.11	15.84
Cabinetmaker.....	.11	.....
Coolie*.....	.13	.....
Bookbinder—		
Native.....		4.22
Foreign.....		6.34
Lithographer*.....		10.56
Furniture polisher.....	.21	.....
Tailor—		
Native.....	.10	.....
Foreign.....		6.34
Pressman.....		6.34
Coachman—		
Native.....		3.17
Foreign.....		6.34
House boy—		
Native*.....		2.11
Foreign.....		4.75
Cotton mill machinist*.....	.11	.....
Cotton factory hands*.....	.22	.....
	.18	.....

**THE COST OF TIES IN TEXAS.**—The cost of tie renewals in Texas is given in the report of the railroad commission of that state for the year ending June 30, 1895, is given in the following table. It will be noted that the price of burnetised ties is a very fair average price for good ties of untreated timber, and their greater life should make them very economical in service.

	Range.	Average.
Burnetised.....	28 to 34	31
Burnetised, pine.....	34.62	34.62
Cedar.....	32½ to 50	41.37
Culls.....	14 7 to 15	14.85
Cypress.....	28.1, 44 and 50	39
Mesquite.....	30	30
Oak.....	20 to 11½	30.75
" hewed.....	15	15
" sawed.....	22	22
" white and post.....	40.17	40.17
" second class.....	15	15
Pine.....	12½ to 45	28.75
" sawed.....	26	26
" long leaf.....	28.8	28.8
" yellow.....	40 to 50	45
" burnetised.....	34.62	34.62
" treated.....	46	46
Bridge ties, creosoted.....	\$1.09 to \$1.12	\$1.10
Switch ties.....	60 to 80	70
" cypress.....	80	80

**A LONG TERM FUEL RECORD.**—A record of coal consumption of a compound condensing engine built by the E. P. Allis Company, of Milwaukee, Wis., was published in a recent issue of *Engineering News*. This engine was supplied with steam by two Reynolds vertical boilers and the record covers three years. The engine was indicated every morning and afternoon and the average taken for the daily record. The boilers were used exclusively for the engine and the coal includes that used for all night banking. The plant is located at the Stevens Linen Works, Webster, Mass. The engine is a cross compound, 22 and 40 x 48 in., and the boilers are 84 in. in diameter:

	1893.	1894.	1895.
Av. " P. hours for year.....	381	393	396
H. P. hours I. H. P. for year.....	1,042,221	893,792	1,076,134
Eng. coal I. H. P. for year.....	1,831,700	1,493,243	1,775,720
Average coal per I. H. P. per hour for one year in pounds.....	1.76	1.67	1.65

This record gives better than a test of a few hours duration the statement of all around working qualities of an engine and is therefore somewhat of a test. It is the first that has reached us giving a well authenticated covering such a long period.

**A USEFUL FIELD INSTRUMENT.**—Lieut. Colonel P. Neville, 14th Bengal Lancers, contributes to the December number of the *Journal of the Royal United Service Institution* a paper on the delineascope. This instrument, he says, is designed amongst other uses, to assist the military surveyor by enabling him to construct maps from landscape sketches; it greatly simplifies and expedites triangulation, and saves much time in plotting. It is very portable, may easily be carried by a mounted officer, who must, however, dismount to use it. The instrument consists of a small camera, having a lens with a fixed focus on a tripod stand. The lens is directed downwards, and carries beneath it a mirror inclined to the axis of the lens at an angle of 45. This throws a true picture of the landscape

on to a piece of tracing paper secured by a frame on a horizontal object glass. In this picture the right and left are transposed. By means of a focusing cloth the picture is transferred to the paper with a pencil. The paper is then taken out and reversed over a graticule on a white card, which divides into large and small squares, and then copied into a sketch book ruled in similar squares. The graticule is made of a size to embrace exactly 30 of horizon, and two such sketches fill one page of the sketch book. After transfer to the sketch book the landscape is finished by eye, according to the ability of the draftsman, but a very simple outline sketch is all that is necessary. There is a margin to every sketch in which to note all particulars regarding the ground, slopes of hills, height and thickness of walls, depth and current of streams, etc.; the back of each sketch is also available for further notes if desired. On the completion of a sketch it is only necessary to take with a prismatic compass the bearing of any perpendicular line—say the center line—and by means of a simple scale of half-degrees on a card the bearing of every point in the sketch may be ascertained. This will be found an immense saving of time, and, moreover, has this advantage that the map can be made from the sketches after the return of the surveyor to camp or quarters—a very important point for a hasty reconnaissance. The instrument can be worked entirely by one person, and all that is required is an orderly to hold the surveyor's horse while he draws. The sketches may be made very rapidly, and, after a trial or two, the primary inconvenience of drawing under a focusing cloth is hardly felt. The camera folds flat, and is carried in a leather case by a shoulder strap. The lens and mirror chamber is carried in a case resembling that of a binocular, but smaller; and the tripod, which can be made of a folding pattern, can conveniently be carried in a carbine bucket.

**USE OF SUPERHEATED STEAM.**—At a recent meeting of the Institution of Mechanical Engineers Mr. Wm. Patchell read a paper on the use of superheated steam which contains some valuable data on this important subject. Superheated steam is steam which has been heated away from any water to a temperature above that at which it was produced in the boiler, and its use enables more work to be done per pound of coal burned than when there has been no superheating. On the other hand, the apparatus necessary to do the extra heating costs money to build and maintain, and therefore it is only in some cases that the increase in the amount of work obtained from the fuel will make it worth while to go to the extra expense to obtain it. In Mr. Patchell's paper it is stated that at the works of Isaac Holden & Sons, in Reims, by heating the steam 56½ deg. the increased work obtained from the fuel amounted to about 29 per cent. At Henry Bruce & Sons' mills, in Currie, Midlothian, superheating of steam from 88 to 98½ deg. increased the work obtained from the fuel about 32 per cent, and at the Thornliebank Company's works in Glasgow there was an increase in work of 20 per cent due to superheating steam about 59 deg. The most noteworthy results were obtained with a Babcock & Wilcox boiler at the central station of the Charing Cross and Strand electricity corporation, where lack of room made it impossible to construct the superheating apparatus in the best way. The chimney draft was aided at times by means of a fan, as on many steamers for ocean service. The method of working was to keep the boiler on natural draft when the amount of steam required was small, and to start the fan as the demand for power increased. Although the superheating was only about 31.6 deg., it produced an increase of 13 per cent in the amount of useful work done the coal, while the use of the fan to supplement the natural draft of the chimney increased the amount of steam obtained from the boiler to 140 per cent.

**DESIGNED BY A BLIND ARCHITECT.**—The Perkins Institution for the Blind at South Boston is to have a new dormitory, and the wonderful part of it is that the plans for it have been drawn by one of the blind attaches of the institution, Dennis A. Reardon. The building will have a frontage of 25 ft., and will be 60 ft. deep and four stories high. It will be built of brick and light sandstone, and it will be ready for occupancy, it is expected, by next June. It is said to be the first case in the world where a blind man has drawn the plans for a public building. Mr. Reardon has been totally blind from boyhood, and received all his training in the Perkins Institution. He now has charge of the printing department in the institution, and all the real estate owned by the corporation as well. Mr. Reardon is 65 years old and lives in his own house, which he himself designed, at 244 East Fifth street, South Boston.

**A NARROW ESCAPE.**—A narrow escape from a remarkable accident, is reported at the central station of the Boston Electric Light Company, Boston. Coal slack, with occasional large lumps in it, is used there as fuel. The attendant was firing the boilers on the day in question, when he observed that one shovelful of coal that he had taken up was noticeably heavier than usual. He did not throw it into the furnace, but put it down on the floor and examined it. He found what appeared, at first sight, to be a rather large lump of coal; but on closer inspection it proved to be a grimy tin box. Calling another fireman to his assistance, he pried the box open, and found it filled with black material that did not look unlike coal dust. The chief of the night force was then called, and he pronounced the contents of the box to be giant powder. If the fireman had thrown it into the furnace, it is likely that the most disastrous results would have followed; for the room contained a battery of 16 big boilers all working under a pressure of 140 lbs. of steam, and if 14 lbs. of blasting powder had been exploded under one of them, it is impossible to guess the amount of damage that might have resulted. It is considered likely that the powder found its way into the coal at the mine, and had afterwards escaped notice until it was taken up on the shovel by the observant fireman. If our opinion were asked, we should probably say that the electric light company ought to do the handsome thing by that fireman.

## THE AMERICAN PALACE CAR.

One of the problems on which car builders and railway men generally have exhausted a vast amount of brain power is the production of a combination sleeping and parlor car, and the result has been the issue of a large number of patents on devices, some of which have merit and others are entirely worthless. The problem is exceedingly difficult of solution, but in the accompanying illustrations it is believed that a thoroughly practical and also a very attractive car, has been produced, which fills the requirements of a parlor and sleeping car.

The illustration, Fig. 1, shows the sleeping berths in process of making up, and Fig. 2 shows the berths



Fig. 1.—MAKING UP BERTHS.

complete and ready for occupancy. From these illustrations it will be noted that the berths are stored beneath the floor of the car and the necessary space for so doing is obtained by a compartment beneath the floor of the car which extends the entire distance between the trucks. Under the floor a pocket or recess is constructed, having its sides formed of heavy steel channel irons. This pocket is dust proof and has a depth sufficient to contain two berths with springs and mattresses, made up complete. When it is desired to make up the berths, a section of the floor is raised, swinging on hinges into a perpendicular position, as shown in Fig. 1. Beneath this there is a second panel which swings up and forms the other end of the berth. These panels are both automatically locked in a perpendicular position and carry sets of pulleys over which small steel cables are run, and these cables support the berths, one being attached to each corner of each berth. The cables are wound about a large drum, and this drum can be rotated by means of a crank shown in the illustration. After the panels are locked in position, the upper berth is run up into place shown in Fig. 2. In Fig. 1 this operation is under way. After the berth is in position, the head boards are thrown up and communication is shut off between this and the next berth. The berth is then locked firmly to the panel at each corner, and all strain transferred from the cables to the locks. These locks are so arranged that any weight added to the berth increases their hold on the panel.

The lower berth is then run up into a position considerably above that shown in Fig. 2, and two of the chairs which are used during the day time, are placed in the cavity beneath, this cavity being of dimensions sufficiently large to accommodate two of them. The berth is then lowered to its proper position. The head boards are thrown up and the foot boards are pulled out for protecting the opening underneath, and after the curtains are hung the berth is ready for occupancy.

The height from the floor to the top of the lower berth is considerably less than in the ordinary sleeping car, and there is therefore more head room and better ventilation in the berth. The ventilation in the upper berth is also very good, as two small windows, each provided with a fixed screen, open above this berth, and are under the control of the occupant without in any way disturbing the occupant of the lower berth.

The space over the trucks in the car is used for state rooms and observation room, and by this con-

struction the sleeping capacity of the car is equal to that of any other. One of these cars has been built and made several tours about the country. It would seem that on long runs, a number of which are made at night and a portion during the day, or trips of several days and nights consecutively, that this car has great advantages over anything yet introduced. It is also believed that roads having short runs where it is desirable to use a car both day and night, that this car would be of great use, making it a sleeping car at night and a parlor car during the day. It would greatly simplify equipment: that is the road using this car would not require the ordinary type of sleeping and parlor cars, one style of car being used for both. This would be very handy for roads hav-

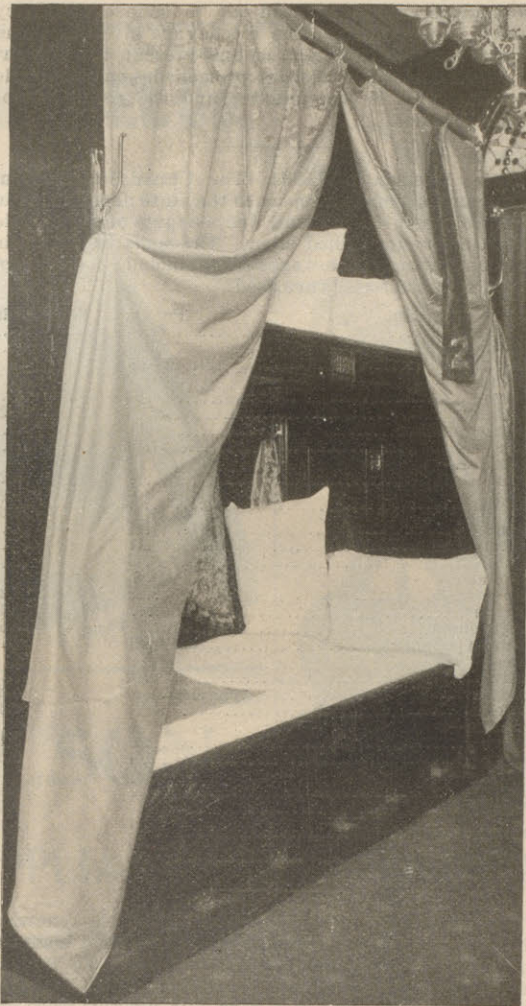


Fig. 2.—BERTHS MADE UP.

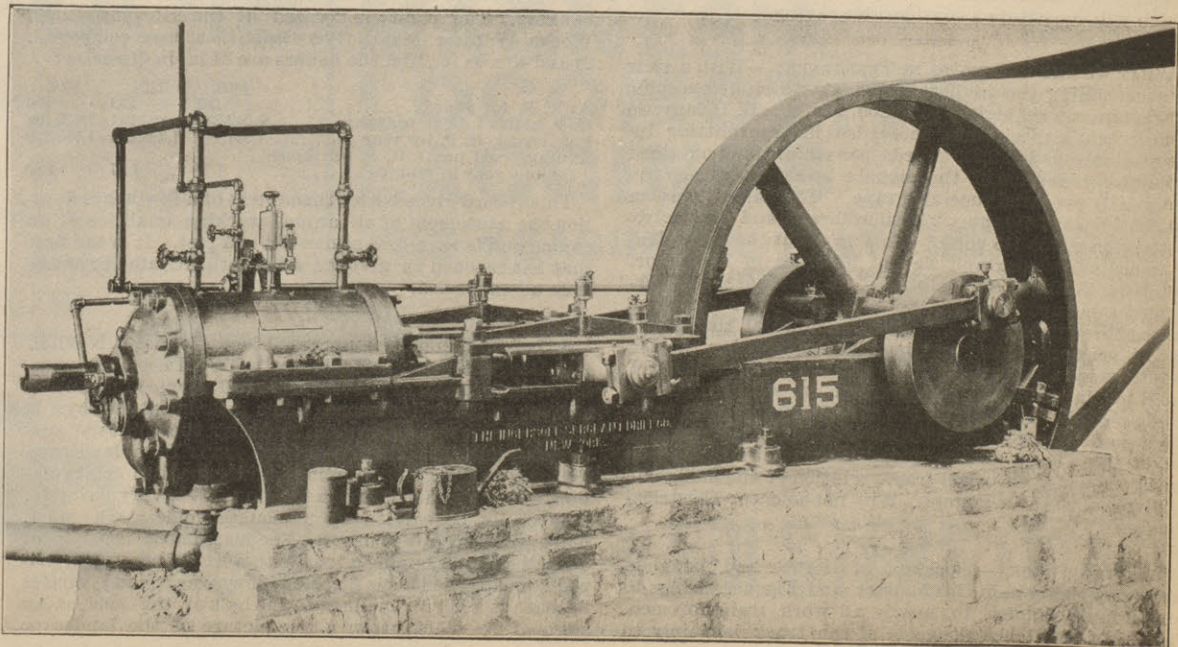
ing a heavy summer business. As an excursion car for large parties it would seem to offer an ideal arrangement. A car recently built has a kitchen in one end, and one of the parties using it has lived in it for some six or eight weeks upon an extended trans-continental trip.

## INGERSOLL-SERGEANT BELT DRIVEN AIR COMPRESSOR.

The Chicago Ship Building Company has recently installed a 12½ x 14 in. Ingersoll-Sergeant class "B" belt driven, air compressor, of the piston inlet pattern, for operating pneumatic hammers, drills, riveters, punchers and hoists, at their ship yards in South Chicago.

Compressed air has been found so advantageous for this work that this company has purchased and will shortly install another Ingersoll-Sergeant compressor, size 18 x 18½ x 24 in., of the class "A" piston inlet type. The combined capacity of these two machines will give the ship yards about 1,000 cubic feet of free air per minute.

The illustration shows the class "B" compressor



INGERSOLL-SERGEANT COMPRESSOR FOR CHICAGO SHIP BUILDING COMPANY.

now in operation, and as this pattern of machine is well adapted to railway shop requirements, we give a detailed description below.

The air cylinder is of the well-known piston inlet pattern, diameter of cylinder 12½ in., stroke 14 in. It is made of the best cast iron suitable for this purpose, and of proper strength and thickness to allow for re boring. Not only the air cylinder, but the heads as well are completely water jacketed, thus insuring a large and effective cooling surface. The bed-plate is of the box girder type made in a single casting, and of sufficient strength to withstand the severest strain of air compressing work. The main shaft is of hammered steel 5 in. in diameter. The bearings are provided with removable and adjustable bronze boxes, and the cranks are of the disc pattern counterbalanced and turned on the face and edges. The crosshead is of cast steel, very heavy, and with a special adjustment to prevent its weight coming on the piston rod. The piston rods, connecting rods and crank pins are of the best forged steel. The piston inlet valves in the air cylinder are warranted by the company for a period of five years.

## LIGHTS FOR NIGHT SIGNALS.

A report of a committee of the Railway Signaling Club to consider the question of the proper lights for night signals was printed in full in the RAILWAY REVIEW of March 14, 1896 page 147 and the following gives the principal points of the discussion which was introduced by a letter from Mr. A. H. Rudd.

HARTFORD, Conn., March 8, 1896.

I think the conclusion of the committee is a very wrong one. I do not believe that because a measure partly right perhaps can be adopted it should be given the endorsement of the club until a long and determined effort to obtain the best has been made. How does the committee know that no radical change will be made in its recommendation? If it recommends something really good, is there not a chance of the American Railway Association endorsing it, and if this is done I believe the change would be made very quickly. The cost of a double spectacle would not be very great, as single ones could be used on distant signals and the double light only used on high speed routes. I believe red for danger and green for clear should be advocated under all circumstances, and if no one can make any other practical arrangement for the caution indication, I would even go so far as to put red glass in the distant signals, the same as the home, but have a large white or some other light fixed on the post to indicate that it was a distant signal. If this distinguishing light went out, your signal would mean stop, if not it would give a caution indication. This would make double spectacle castings for all signals and one additional light on each distant. This is only a suggestion, the report came too late for me to elaborate or give it much thought, but my feeling is, no matter how popular on the score of economy such a recommendation might be, don't endorse one that means that a possible break will show a clear signal; anything but that, even a sign board for caution, but insist on green for clear.

Mr. Sperry—I think Mr. Rudd is on the right track. We shall have to come to green for clear. I am convinced of that by the large expenditures made in England for the purpose of changing to green for safety indication.

Mr. Sperry then read the following letter:

LONDON & NORTHWESTERN RAILWAY,  
SIGNAL SUPERINTENDENT'S OFFICE,  
CREWE, March 11, 1895.

DEAR SIR: I am obliged by your letter of the 19th February. I have noticed that your railway people have been discussing the question of abandoning the use of white lights as "all-right" signals, and that they have been desirous of having some distinctive light for the distant signal. Nearly all railway companies in this country are abandoning the white light, or have already done so, but I do not know of any case where a distinctive light is shown for the distant signal, nor have I had any expression of opinion that such distinctive light is necessary. If, however, a cheap and simple scheme is introduced which will not involve an extra light I think it would meet with approval. I am acquainted with the lamp you refer to designed by Saxby & Farmer, but I am not aware of any company having adopted the arrangement, although it is possible that some few have been provided experimentally.

Yours truly,

A. M. THOMPSON.

H. M. Sperry, Esq.  
Chicago, U. S. A.

Mr. Sperry—The lamp referred to in the letter is something like Mr. Carter's lamp on the table. (Mr. Sperry

explained the construction of the lamp in question.)

Now the special point, as I understand it, that interferes with the adoption of the green light is the cost, and I have made some figures in this connection. In the first place the ordinary signal casting costs \$2.25. The Chicago & Northwestern type costs \$3; therefore, in installing new plants it would be necessary to spend 75 cents more per signal to get the double casting. So much for the home signal. As to the distant signal, a special lamp must be provided, as I am unable to see any method of distinguishing a distant signal aside from the combination light. That lamp costs \$4, or 75 cents more than the ordinary lamp, and as you have but few distant signals, you do not have to spend very much money. Of course, those figures may seem high to some of our friends who think they manufacture lamps at very much lower cost. We, however, give the price as we see it. Now then we will take a large division, that is as far as signals are concerned, the New York division of the Pennsylvania Railroad and take the signal report for 1895. They had 550 interlocking levers, 1,110 signals, and 677 miles of track. Now if we take, say 1,100 signals and provide new castings, it would cost, including the labor, about \$4,000, and if we add say \$1,000, for additional lamps, we will have \$5,000 for changing some 1,100 signals to this system. We would also be obliged to change the lenses in the switch lamps. I have no accurate record of the number of switches in use, and assume that 1,000 switch lamps would cover the New York division. We would have to provide green lenses at about 25 cents each, and some little labor of putting them in would add about \$750 to the other total, which would make, we will say, \$6,000 for changing a division of 90 miles of four-track road, and if we take the other divisions with the same total, we could change all the signals between Pittsburgh and New York City on the main lines of the Pennsylvania Railroad for \$30,000. Possibly if you take the entire system east of Pittsburgh it would be \$50,000. West of Pittsburgh would be considerably less. Of course this is a large sum of money, but it also represents a very large railroad system, and the figures are purposely made as high as possible. On other roads, particularly roads here in the west which have not gone into signaling as extensively as the Pennsylvania road, the change could be made more easily. I should say that we could change many of the lines that have a large outfit of signals for \$5,000, and when we consider that it is the opinion of many that this change will have to be made some day, I think it is about time to think about it and make some preparations for it. I am informed by reliable authority that one of the strongest reasons why the American Railway Association did not endorse the use of the green light was due to the influence of the Pennsylvania railroad. When you consider that we have made such efforts in every other direction to perfect our interlocking appliances, and are now to be at the mercy of a broken glass, I think it is a serious matter not to make some move in the direction of making a change. As to the use of wire glass—manufacturers of this kind of glass are doing such a large business in making skylights that they do not care about making a few signal glasses for railroads, and it will probably be three or four years before they will make any effort to turn out railroad signal glass with wire netting incorporated therein.

Mr. Spicer—The question of the third light with the distant signal is the most troublesome question. I think we had better not enter into that yet. I shall not attempt it. I want to say in regard to the distant signal, that we look at this question differently from what the English do. Their practice is to have a red light in the distant signal, so that practically the distant signal becomes a home or stop signal at night, and I do not see how it can be treated in any other way at night, but a great many of us are of the opinion that the distant should be a distant signal by day and night, and in order to emphasize the night signal we brought up the third light or some distinguishing light for the distant signal. Now the practice of using white light for the clear is pretty well established, and in a majority of cases serves the purpose very well, and it seems to me that if we are stalled on this question of a third distinguishing distant signal light, that the thing to do is to strengthen our colored glasses with a wire netting, or strengthen the glass by making it thicker and heavier, to resist any accidental or malicious breakage and improve the present system in that way. It is a pretty good system, as it is; it served us very well for all these years and is weak mainly in the one fact that the glass is perishable.

The propriety of abandoning a distant signal entirely as such, making it a stop one, has been discussed more or less, and has been looked at rather seriously by some people. At a terminal or in yard work, where slow movements are practiced, the distant signal is not of very great importance; it can be looked at in that light; but where a distant signal is of importance is where high speeds are indulged in over the crossings and junctions on the main line, so that under those conditions the distant signal is probably the most important signal in the plant, and it invites high speed or checks up high speed according to its position. Where a distant signal invites high speed it invites everything that tends towards a very serious wreck in case the signal indicates improperly. I got up to say principally that if we have to abide by the present signal light, the first thing to do is to make that imperishable, and the most practical way which presents itself now is by means of re-enforcing the glass either by wire netting or by strengthening the glass, or both, making a pretty good arrangement ever so much better.

Mr. Elliott—The only question seems to be simply between the use of the "Carter" distant signal lamp for the distant signal, or the use of white for clear, abandoning the use of green as a caution signal. The objections I have to the "Carter" lamp are merely matters of preference. I have looked for differences in the quality of illumination, and practically I think there is none. You can distinguish the green and the red at about the same distance. As to whether the engineers would be more apt to observe a green light having a red one along side it, or take more caution therewith, I do not know. That seems to work successfully on the Chicago & Northwestern, and they do not have any trouble about it. The lamp, on the table, is different from the ones generally used, in that it has the red lens in the lamp and not the red glass in the spectacle. On account of the thickness of the spectacle casting, snow would collect on the rim and blot out the light and

give a clear signal, and it has done that in two instances, one on our road and one on the C. & N. W. I think that the recommendations of the American Superintendents' Association is quite good, and I am satisfied to stick to white for all clear signals.

Mr. Miles—The committee says that it thinks the "Carter" light with a distant signal is practicable and all right, and the main objection to that system is that it will cost so much that it is not advisable to recommend it. I do not think that the club should go on record as recommending a thing that is not entirely safe and is admitted to have faults, when they can recommend something a great deal better that costs no more. I think that signal men should recommend that which is safest and leave the general managers to say what they want. If they want something cheaper and not as efficient, let them decide, and let the club recommend what is admitted to be the safest. There are several reasons for a change that have been advanced, aside from the fact that the English have adopted the green, and the first is the matter of strong lights, in which the white leads all others, and then the next important one perhaps is broken glass. I know of some cases where broken glasses were found in the signals where the glass was broken for at least two weeks, the signal was very seldom operated and the glass was not inspected and there might have been a serious accident on account of it. That case may come up on any road, and I for one am not in favor of recommending white for safety when we can get something better, and when the committee say they think the "Carter" light is practicable.

Mr. J. A. Wilson—It is said that the club should recommend what is best and safest and leave to the general

be submitted to the members to be voted on by letter ballot: "Shall the club make any recommendation at this time as to the colors to be used for night signals." Carried.

The report of the committee on rules was then read by the secretary. The report was accepted and the discussion deferred until the next meeting.

#### WATER TANK AT ELMHURST—C. & N. W. RY.

A new water tank and stand pipe equipment has just been installed upon the Chicago & Northwestern Railway at Elmhurst, Illinois, which is worthy of more than ordinary notice. This installation was made by the U. S. Wind Engine & Pump Co. of Batavia, Ill., and embodies the latest and most approved practice of this concern in providing equipment for prompt delivery of water to locomotives. It is a departure from the ordinary practice in that the water passages have been made unusually large, so that the records for quick service which have been obtained, are remarkable. The tank is 16x24 ft., and of 50,000 gals. capacity. It is placed upon a frame of Larimer columns, 23 ft. high. The construction of this tower or frame work is clearly shown in the illustration which was taken from a photograph, and in which the girths and braces and the saddle attachments between the girths and the columns are clearly shown. The construction of these attachments was in accordance with designs of Mr. William H. Finley,



ELMHURST WATER TANK—CHICAGO & NORTHWESTERN RAILWAY.—FIG. 1.

managers the question of how much money they want to put into the construction. I would like to ask if the general managers have asked for a change in the present system of light signals? If the question of danger in using the white for clear is more dangerous in theory than it is in practice and if the statistics show that the wrecks or accidents from broken glass have led the general managers to ask for something better.

The President—The question of night signals, as I understand it, was brought up by the committee on safety appliances appointed by the American Railway Association and in order to ascertain the position of the various roads on that question, a circular was sent to members of the association asking their opinion as to the use of green for clear and red for danger. My recollection as to the reports was that a majority of the replies favored the use of the present practice, that is, white for clear and red for danger.

So far as the recommendations of the committee are concerned it seems to me if their recommendation is to be adopted or considered it would be more consistent to go back to the old system, putting a lens in the spectacle casting instead of in the lamp. The liability of breaking a lens is very much more remote than the breaking of a piece of glass one-eighth of an inch thick. The objections of putting a lens in the spectacle casting, however, is that you cannot get a proper focus on your lamp and also the fact that sleet and snow will accumulate in the concave side and obscure the rays. I think we should be in a position to make recommendations in regard to our deliberations, but I believe in going slow and considering these questions very closely and we should be prepared to stand by our recommendations.

It was moved by Mr. Elliott that "it is the sense of this club that the use of red for danger, green for caution and white for all clear is the best practice according to our present information".

The foregoing motion was put to vote and declared lost. It was moved and seconded that the following question

engineer of bridges of the road. According to a report made by Mr. R. C. Sattley, superintendent of bridges and buildings of the road, who made some tests for the purpose, the discharge of the water was found to be 4,000 gals. per minute at Elmhurst. The stand pipes, of which there are two, are 10 in. in diameter, and the one through which the water was delivered in the test was connected to the tank by 300 ft. of 12 in. pipe, in which there were three right-angle elbows. A 12 in. tank valve of the Halliday pattern is placed in the bottom of the tank and a 12 in. gate valve is placed in each of the pits near the water columns. In this way either standpipe may be cut off from the tank for repairs without losing the water in the connecting pipe and without interfering with the other standpipe, or in case of damage to the connecting pipes, the water in the tank may be saved by means of the tank valve, which is ordinarily held open. The tank at Elmhurst has an elevation of 23 feet above the rail, and during the test it was full of water.

A test made at Dixon, Ill., on a similar equipment, was also noteworthy, in which case the stand pipe was located at a distance of 900 ft. from the tank. This stand pipe was 10 in. in diameter and the connecting pipe was 12 in. in diameter, with three right-angle turns. The tank was raised on 20 ft. posts and was of the same capacity as the one at Elmhurst. The time required for discharging 3,200 gals. was 1½ minutes, which enables a rough comparison to be made of the effects of the different lengths of pipe upon the rate of discharge. Details of the arrangement of the water column in the pit are shown in Figs. 2 and 3, in which Fig. 2 illustrates the arrangement for returning the spout into a position parallel to the tracks after use, and holding it there until it is again

wanted. The action of the spring, the cams and the rollers will be readily understood by reference to the drawing and to Fig. 3, which shows the same parts in elevation. In Fig. 3 the valve chamber is shown broken away to expose the interior construction of valve, and in this view also the mechanism operating the valve may be seen. The operating lever is located at the end of the spout and connects by means

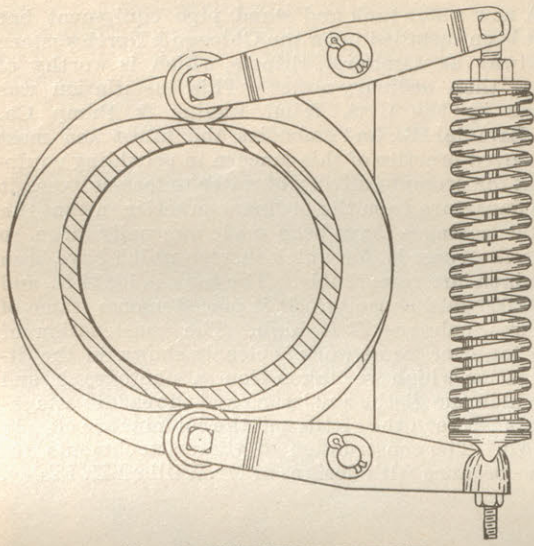


FIG. 2.—TURNING DEVICE.

of two rods and bell cranks to two rods which run vertically downward to the cast iron collar, shown in Fig. 3, which surrounds the stand pipe. This collar, by means of rollers, communicated up or down motion to the left hand end of the lever which operates the valve. Connection between this lever and the valve is made with the spiral spring for the purpose of preventing too sudden closing. The valve is of the balanced type, the pressure upon the upper and lower

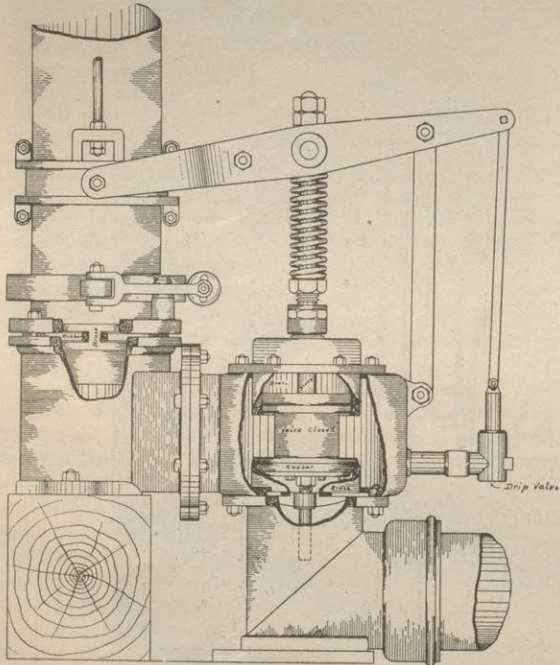


FIG. 3.—VALVE MECHANISM.

wings of which is so adjusted as to render it easy of operation. The little drip valve at the right consists merely of a cylinder and a plunger, and is open when the main valve is closed. The packing joint at the bottom of the water column is made by means of a brass ring cast upon the base of the stand pipe and which is received between suitable bushing or ring, and the flanged top of the elbow at the bottom of the stand pipe to which the valve casing is bolted.

#### COMPARATIVE BOILER TEST WITH GAS FUEL.

A copy of a report of an interesting boiler test made for the Carrie Furnace Company, of Pittsburgh, by the Pittsburgh Testing Laboratory, has just been received. This test was made for the purpose of comparing a 250 horse power Babcock & Wilcox boiler with a Cahall boiler of the same nominal capacity. It was undertaken with a view of determining the relative performances and efficiencies of the two types of boiler when working under practically identical conditions. The test covered 12 hours and was completed at 7:15 a. m., February 1, 1896. The two boilers tested were units in two large batteries of each of the types which furnish steam for the pumps and blowing engines at the works mentioned. The boilers are fired by gas from the blast furnaces from which they receive a supply continuously. The boilers were thoroughly clean before testing and every precaution was taken to make the conditions as nearly alike as possible, the only significant difference being that the gas for the Babcock & Wilcox boiler was obtained from the main flue, whereas, the Cahall boiler drew its supply from a side connection of smaller diameter which was tapped into the large flue, thus giving the former boiler an advantage.

The Babcock & Wilcox boiler had 2,872 sq. ft. of heating surface and the gas was fed into a combustion chamber 8 ft. 6 in. wide in front by 4 ft. 6 in. high by 3 ft. 6 in. deep. Two feet of the depth was used to collect the ore dust as it dropped in coming through the burner which was drawn out through side door 13½ x 24 in. The Cahall boiler, as is well known, has vertical water tubes to the number in this case of 108 of 4 in. diameter. These were 22 ft. long, giving 2,500 sq. ft. of heating surface. The combustion chamber of the Cahall boiler is 7 ft. wide, 3 ft. 10 in. high, and 6 ft. 11 in. deep horizontally. The ore dust was deposited in a pit below and is drawn out through a cleaning door. The smoke stack of the Babcock & Wilcox boiler was 4 ft. 6 in. diameter and 107 ft. high. That of the Cahall boiler was 38 in. in diameter and 79 feet high. Two Kennedy burners were used for each boiler, that of the Babcock & Wilcox having a total area of 127.4 sq. in., as against 181.5 sq. in. of the Cahall. No coal whatever was used. The water was measured in two supply barrels, the temperature of the escaping gases was taken by means of pyrometers, the gas and products of combustion were tested repeatedly during the trial and the moisture of the steam was taken by means of throttling calorimeters. The results of the calorimeter experiments showed an advantage of about 35 per cent in favor of the Cahall. Care was taken to see that the draft in the two boilers was the same as measured by ½ in. of water column. Observations of all instruments were taken every 15 minutes throughout the test.

A special point of interest about the test beyond the recorded results is the fact that they were made at the request of the users of the boilers with a view of settling the question of efficiency and not being directed in any way by the friends of either type, the results may be taken as fairly representing the actual service conditions. It should be noted, however, that while the Babcock & Wilcox boiler had gas of the better quality than its competitor, it was handicapped to some extent by insufficient air opening at the burners, and also by some leakage through the setting. The following statement is quoted from the report which was signed by Mr. A. D. Bellows, general manager of the Pittsburgh Testing Laboratory, Limited, under whose direction the tests were made:

The results of this comparative test in the main are not as satisfactory as we might desire, as we should much prefer to have seen the B. & W. boiler show a better efficiency, but considering the fact that air was practically excluded from the B. & W. boiler at the burners, there was a heavy percentage of the fuel unburnt in the escaping gases. No doubt the percentage was really larger than the analysis show, as air leaking in at the side doors and at the grate door probably helped to burn some of the CO gas just before it reached the stack, or burning it at a point where it practically did but little good. The burners were fitted with collars, which were meant to exclude most of the air. In the Cahall Boiler, collars were also placed around the burners, but there were saw tooth notches which let in more air than at the Babcock & Wilcox, although the Cahall used perceptibly less gas. There is no doubt but that had the Cahall had an equal amount of gas as the B. & W. and its collars removed, it would have shown a higher efficiency and much greater development of horse power. The B. & W. boiler also under better conditions would have made a better showing, but allowing for these conditions one who is familiar with both boiler plants cannot but be impressed with the excellence of the Cahall boiler. That better results should be obtained from the Cahall is only natural, as the best results are obtained when waste gases are used, in long tubular or return flue boilers, such as the Cahall. In the case of the shorter water tube boilers, the gases do not have an equal opportunity to give up all of their heat before reaching the stack at a satisfactory temperature; that is, in the last named class of boilers, the stack temperatures are generally much higher than the case of the long tubular or return flue boilers, and therefore their efficiency lower. It is interesting to note from the results given in the tabulated report that while the B. & W. evaporated more water it did so with a much greater heating surface, and when the two boilers are compared on an equal basis of heating surface, the Cahall notwithstanding it had less gas, evaporated more water per square foot of heating surface. That the Cahall had much less gas was very perceptible to one standing in front of either boiler and was due to the fact of the manner of piping.

The Cahall boiler uses practically no coal at any time, while the B. & W. boiler is very frequently fired quite hard with coal when the steam is slack or gas becomes poor. We have tested quite a number of different makes of boilers, and all our experience has been that the Cahall can make steam on the smallest amount of waste gases, which, of course, is due to the high efficiency which it develops as shown by tests made by different independent engineers.

We also attach to the end of the report a graphic log (not reproduced) which is very interesting to examine, as it shows with each fluctuation of gas the corresponding fluctuation in the steam pressure, generally the dropping in the steam pressure being directly after each casting. It also is interesting to note that when furnace No. 1, which is nearest the boiler, cast, the pressure was the least and when furnace No. 2, which is farther from the boiler, cast, that it made not nearly so much difference in the amount of gas in the boiler. One can also see the amount of gas which the B. & W. boiler had in excess of the Cahall, and note the comparison of their respective stack temperatures. By examining the curve of the water per hour, one sees that the B. & W. did its best work in the first four hours and that in the last eight hours barely kept ahead of the Cahall, even running behind in the ninth and twelfth hours. The curve

which shows the true comparison of the two boilers is that of the "water evaporated per hour per square foot of heating surface." This shows that outside of the third and fourth hours the Cahall boiler evaporated easily more water per square foot of heating surface.

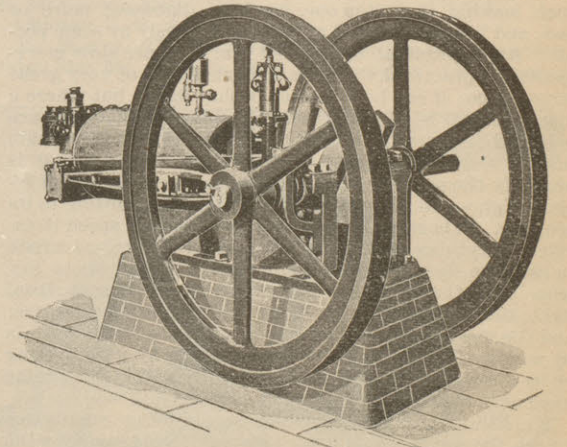
#### TABULATED RESULTS.

Dimensions and Proportions.		B. & W.	Cahall.
Number of steam drums.....	3	1	1
Diameter of steam drums.....	36 in.	80 in	
Length or height of steam drums.....	18 ft. 3 in.	6 ft. 8 in	
Diameter smoke flue through steam drum..		34 in	
Number of mud drums.....	1	1	
Diameter of mud drums.....	12 in.	68 in	
Length or height of mud drums.....	8 ft. 6 in.	4 ft	
Number of tubes.....	126	108	
Diameter of tubes.....	4 in.	4 in	
Length of tubes.....	18 ft.	22 ft	
Height of smokestack above burners.....	107 ft.	79 ft	
Diameter of smokestack.....	4 ft. 6 in.	3 ft. 2 in	
Heating surface.....	2,872 sq. ft.	2,500 sq. ft.	
Fuel—Quantity.			
Gas total at temperature at burner.....cu. ft.	4,484,352	2,651,952	
Gas per hour temperature at burner.....cu. ft.	373,696	220,996	
Equivalent gas total at 32 deg. F.....cu. ft.	2,540,028	1,562,664	
Equivalent gas per hour at 32 deg. F.....cu. ft.	211,669	130,222	
Average heat in 1 cu. ft. of gas, at 32 deg. F., from analyses of gas.....B. T. U.	87.03	92.05	
Heat delivered to boiler, total.....B. T. U.	221,058,636	143,843,220	
Heat delivered to boiler, per hour.....B. T. U.	18,421,553	11,986,935	
One pound theoretical combustible as a standard of comparison.....B. T. U.	14,500	14,500	
Equivalent combustible from analyses of gas, total.....	15,249 lbs.	9,920 lbs	
Equivalent combustible from analyses of gas per hour.....	1,270.5 lbs.	825.7 lbs	
Water.			
Water apparently evaporated, actual condition, totals.....	117,406 lbs.	107,379 lbs	
Water apparently evaporated, actual conditions, per hour.....	9,783.8 lbs.	8,948.3 lbs	
Quality of Steam.			
Entrainment (by throttling calorimeter)....	1.56 pr. ct.	1.16 pr. ct.	
Water Actually Evaporated.			
Actual conditions (corrected for entrainment), total.....	115,584 lbs.	106,133 lbs	
Actual conditions (corrected for entrainment), per hour.....	9,632 lbs.	8,844.4 lbs	
Economic Evaporation per 1,000 cu. ft. of Gas at 32 Deg. F.			
Water actually evaporated (corrected for entrainment).....	45.50 lbs.	67.92 lbs	
Equivalent from and at 212 deg. F.....	49.06 lbs.	73.29 lbs	
Economic Evaporation per 1 lb. Equivalent Combustible.			
Water actually evaporated (corrected for entrainment).....	7.58 lbs.	10.69 lbs	
Equivalent from and at 212 deg. F.....	8.17 lbs.	11.54 lbs	
Horse Power and Heating Surface.			
Heating surface per h. p. rated by makers	11.5 sq. ft.	10 sq. ft	
Commercial rating.....	250 h. p.	250 h.p.	
Basis of 10 sq. ft. of h. s. per h. p. (standard of comparison).....	287.2 h. p.	250 h.p.	
From and at 212 deg. F. (actual).....	346.2 h. p.	318.1 h.p.	
Centennial standard (actual).....	335.2 h. p.	308 h. p.	
30 lb. per hr. from feed water 100 deg. F. Boiler gage pressure, 70 lb. Percentage above commercial rating, centennial standard.....	34.08 pr. ct.	23.20 pr. ct	
Percentage above rating (on equal basis of 10 sq. ft. of heating surface).....	16.71 pr. ct.	23.20 pr. ct	
Heating surface per h. p. c. s. ....	8.57 sq. ft.	8.12 sq. ft.	
Combustible (equivalent from analysis of gas) per h. p., per hour.....	3.79 lbs.	268 lbs.	
Water evaporated per hour, per sq. ft. of heating surface.....	3.35 lbs.	3.54 lbs.	
Efficiency.			
Total heat absorbed by steam.....B. T. U.	120,369,178	110,611,604	
Total heat delivered to boiler.....B. T. U.	221,058,636	143,843,220	
Efficiency or percentage of total calorific power utilized.....	54.45 pr. ct.	76.89 pr. ct	

#### THE NATIONAL GAS ENGINE.

We have on several occasions in these columns spoken of the advantages to be had by the use of gas engines, and herewith an illustration of the National gas engine is shown, which is manufactured by the Cook-Stoddard Mfg. Co., of Dayton, Ohio. The special features of this engine are the governor valves and igniter which are the most essential features of difference between gas engines.

The governor is driven directly by the shaft of the engine without a belt and has instantaneous control of both the gas and air valves so as to prevent the



admission to the cylinder of any gas except that mixed with the proper amount air for doing effective work. The valves are, it is claimed, a new departure in gas engines, being so constructed as to be absolutely balanced and entirely without springs. The valve mechanism is operated from the main shaft by an eccentric, is positive in its operation and has no gears, cams, springs or levers. The balancing of the valve certainly greatly reduces wear of the seat and saves power as well as wear and tear on all parts of the engine.

The head of the igniter is formed in the shape of a valve which is seated against the igniter chamber

and prevents leakage of compressed gases without other packing and therefore requires very little attention. The points of the igniter are made of platinum, which material it is claimed will last almost a lifetime. The cylinder of the engine is cast with a water jacket completely surrounding it and is cast separate from the bed plate so it can be readily repaired. The crank shaft is a solid forging and is milled into shape. The rod is forged steel and has gun metal bearings. Most of the exhaust gases are discharged from the port of the cylinder without passing through the main valve which is a great advantage to that portion of the engine in saving it from the most intense heat.

These engines are built in sizes varying from 2 to 40 horse power and will use either gas or gasoline. It is claimed that these engines use from 20 to 30 cu. ft. of illuminating gas per I. H. P., and that the mechanical efficiency is 85 per cent, or that 20 cu. ft. per hour I. H. P. corresponds to 22 cu. ft. per B.H.P. One of them is running the shop of the company at Dayton using natural gas, and the cost per month for producing 100 H. P. is said to be only \$18 against \$85 with a steam plant, the cost of gas being 25 cents per thousand and coal \$1.20 to \$1.50 per ton.

#### TRACK ELEVATION—N. Y., N. H. & H. R. R. IN BOSTON.

The extensiveness of the track elevation work now in progress upon the N. Y., N. H. & H. Railroad has been described and many are familiar with the general outline of the plan, yet it will probably not be amiss to give the following brief statement of the plans. The tracks upon the Providence division are to be elevated beginning at Massachusetts avenue, rising to the south from a point on a 0.6 per cent grade to an elevation of 18 ft. above the existing grade at Roxbury station. From this point the average elevation is to be 20 ft. to Washington street, Forest Hills, where the grade starts downward again to meet the existing grade about 3,000 ft. further south. The total length of the elevated portion is about 4½ miles and the grade at the ends is to be 30 ft. to the mile. Four tracks are to be raised, the two center ones being used for express and the outside ones for suburban business. New stations are to be built upon both sides of the tracks at five different points, connected by a subway. Sixteen grade crossings will be eliminated and one street now crossing the right of way by a bridge will be carried beneath. This work will require sixteen bridges for the right of way and one stone arch street bridge. Thirteen of these will be plate girder bridges, several of which will have one street and two sidewalk spans. Two of the right of way bridges are steel arches and one has stone arches. Retaining walls are to be built on both sides of the right of way for a distance of about a mile at the north end. A section of the wall is shown in Fig. 1. These retaining walls are of granite and the outside edge of the coping is to be brought to the property line.

It is proposed to elevate without interfering with trains and without closing streets. Except at the mile of elevation at the north end, strips of land were purchased on each side of the original right of way upon which temporary tracks are located for construction purposes. From the north end to a point a mile south thereof, the right of way averages about 66 ft. in width and from this point to the south end of the elevation, a width of about 200 ft. is obtained. The two westerly tracks are to be raised

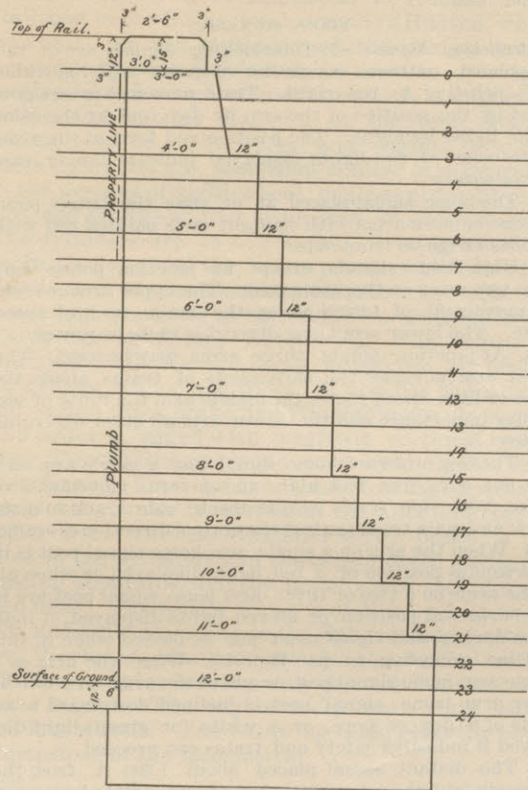


FIG. 1.—SECTION OF RETAINING WALL.

thereon before putting the other two tracks out of service. The north mile of the elevation is to be done by means of a trestle which will raise the two west tracks to the proposed elevation at the outset from which filling will be done. The stations and abutments will be completed simultaneously with the trestle and when the work is completed,

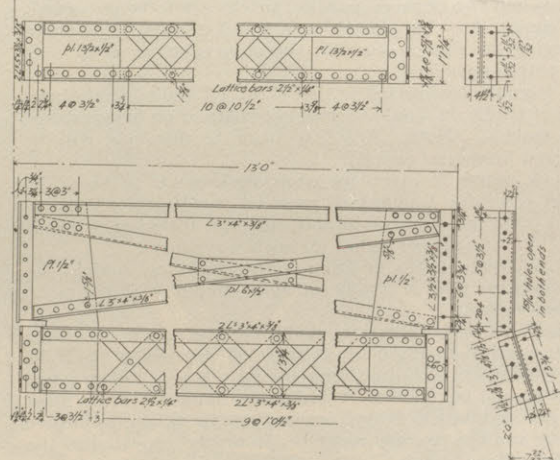


FIG. 4.—INTERMEDIATE BRACES.

the eastern retaining wall will be constructed where necessary, the track on that side taken out of service and the work for the four tracks completed. The work has to be done without interfering with the trains which amount to about 206 per day and this necessitates a good deal of night work. The

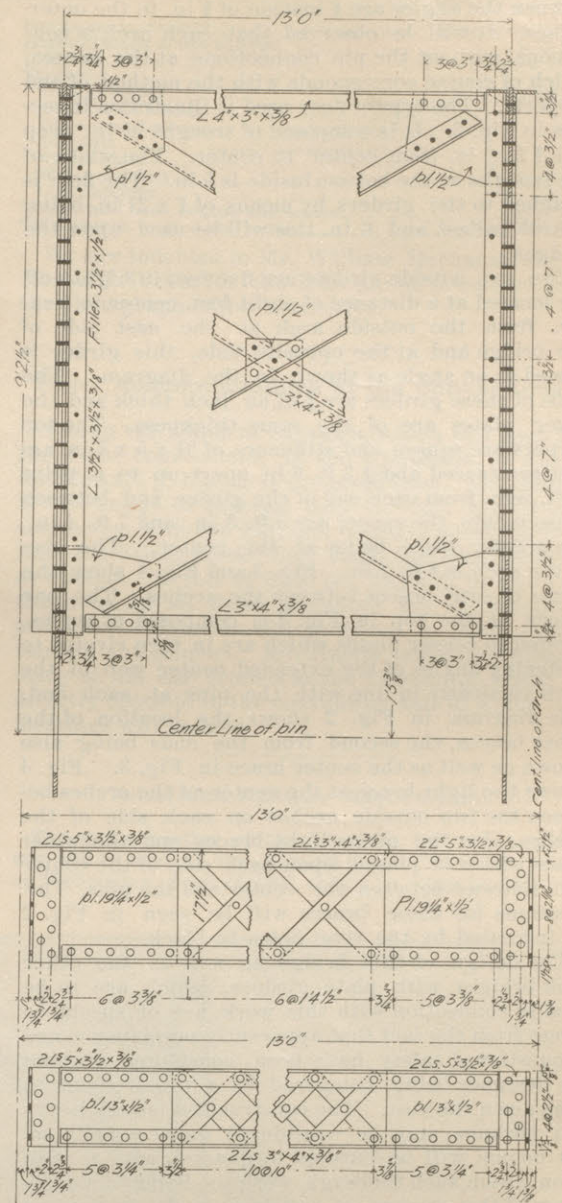
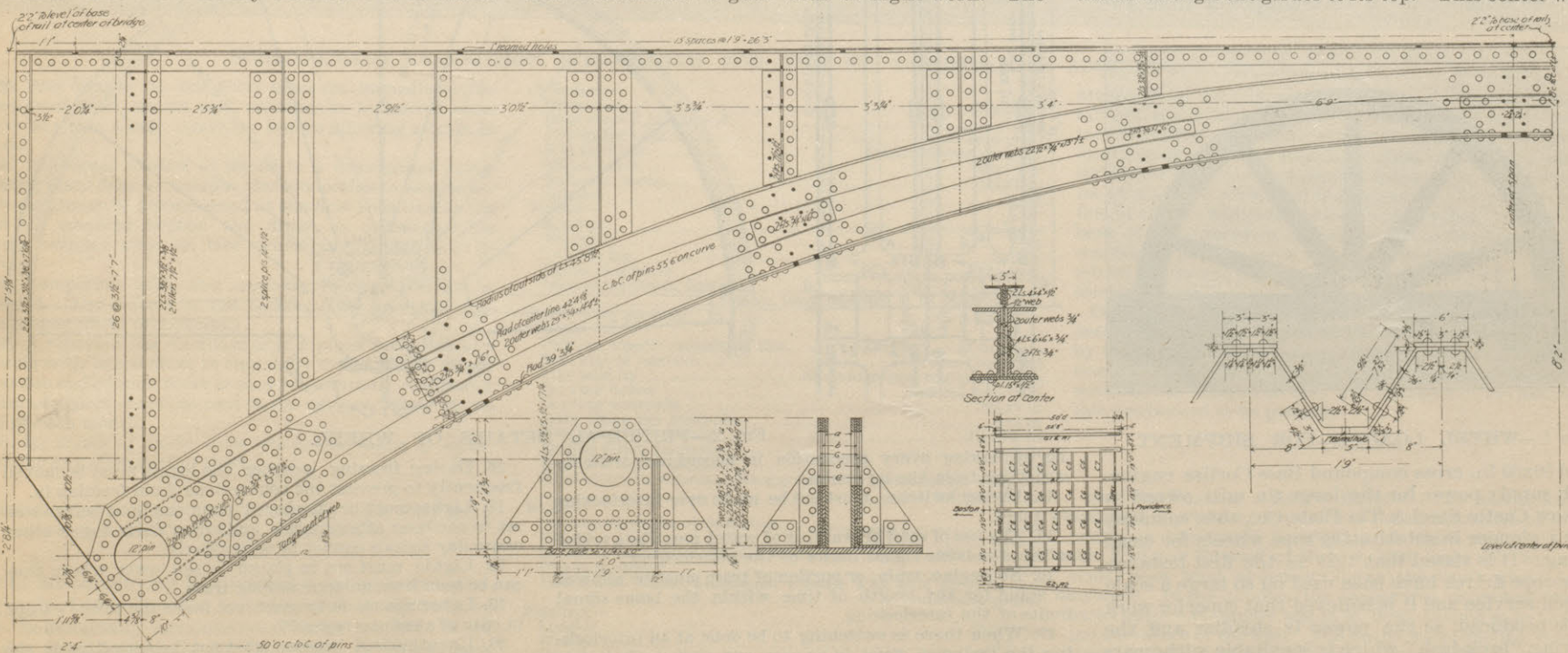


FIG. 3.—SWAY BRACES.

Through the courtesy of Mr. F. S. Curtis, chief engineer, and Mr. C. M. Ingersoll, Jr., assistant engineer of construction, we are enabled to illustrate two of the bridges which are to be employed upon this work, namely, at Walkhill at Washington streets. Some of the details of the former are shown in the accompanying engravings which were made from the working drawings. This bridge consists of five plate arches at 13 ft. centers, and two plate girders outside of these, the relative locations of which are shown in the small diagram of Fig. 2. The arches have a span of 50 ft. between centers of pins. The pins are supported in the shoes shown also in Fig. 1, each of which is held to its seat upon the abutment by means of six 2 in. stone bolts. The method of constructing the arches is so clearly shown in the illustration as not to require special explanation except to state that in the arch itself there are three web plates, the center of which continues through the girder to its top. This center web



TRACK ELEVATION IN BOSTON—FIG. 1.—ARCH FOR WALK, HILL STREET BRIDGE.

first and the retaining wall upon this side will be completed throughout, at the same time filling will be done for the tracks up that side. Temporary trestles will be used as approaches to the bridges where necessary. The abutments for the bridges are to be built across one-half of a street at a time and the bridge completed and the track placed

extension of the property line necessitated the moving of a large number of buildings and the construction of a conduit 18 feet in diameter and 3,000 ft. in length to provide for the waters of Stony Brook. The switches controlling the tracks at Forest Hills are handled by a temporary arrangement of the interlocking plant at that point.

is of ½ in. plate and the difference between the three inside and the two outside arches is that the three center ones are provided with outer webs ½ in. thick, whereas the outer webs of the outside arches are ½ in. thick. There are also slight differences in the weights of the angles of the arch from ½ to ¾ in., and of the bottom plates from ¾ to 1 in., and the fillers

between the angles are  $\frac{3}{4}$  instead of  $\frac{1}{2}$  in. in the outer arches. It will be observed that each arch is continuous without the pin connections at the center, which of course corresponds with the method of end supports. The type of floor used is illustrated in section in Fig. 2. It is composed of troughs  $9\frac{1}{2}$  in. deep and 1 ft. 9 in. from center to center. The width of the troughs at the bottom inside is 5 in. The floor is attached to the girders by means of  $\frac{3}{4}$  x  $2\frac{1}{2}$  in. bolts. Gravel ballast and 6 in. ties will be used upon the bridges.

The two outside girders are five feet in height and are located at a distance of eight feet, center to center, from the outside arch at the east side of the bridge and at the opposite side, this girder is placed at an angle as shown in the diagram. The webs of these girders are  $\frac{3}{4}$  of an inch thick and the cover plates are of the same thickness. The top corners are square and stiffeners of  $3\frac{1}{2}$  x  $5$  x  $\frac{3}{4}$  in. angles are spaced about 3 ft. 6 in. apart up to a point 18 ft. 5 in. from each end of the girder and between these points, the spaces are 5 ft. 3 in. and 7 ft. 4 in., the greater space being at the center. The rise of the arch is 8 ft. 2 in. Fig. 3 and Fig. 4 show the forms of sway braces between the arches. The one shown at the top in Fig. 3 is composed of angles, riveted to corner plates which are in turn riveted to stiffening angles of the extended center web of the arch vertically in line with the pins at each end. The diagram in Fig. 2 shows the location of the other braces, the second from the ends being also shown as well as the center brace in Fig. 3. Fig. 4 shows the light brace at the center of the arches between the two outside arches on each side of the bridge, also the other light braces and the wider brace which is placed upon each side of the center and midway between the center and the pins. The locations for these braces will be seen in Fig. 2 as indicated by the rivet holes in black.

The design of this bridge as well as the other deck bridges with plate girders, which are to be used in connection with this work, are of special interest from the fact that apparently permanence and unquestioned safety have been considered without the designer being hampered by a requirement to keep down the cost. The construction is very heavy and perhaps may be considered unnecessarily so, yet no one will be disposed to quarrel with a road upon which such thorough work is being done, because of the amount of material used. It seems a little strange that an arch should be employed for such work as this, but doubtless appearance is considered an important factor in connection with the new park work which Boston has on hand in this neighborhood. It is hoped that we shall be able to illustrate another of these bridges within a short time.

#### A LARGE ROPE WHEEL.

The large rope driving fly wheel of which the accompanying illustrations show the chief dimensions, was recently shipped by the Bass Foundry & Machine Works, of Fort Wayne, Ind., to New Castle, Pa. Fourteen car loads like the one shown in Fig. 1 have been shipped altogether, and six of these bolted together make a fly wheel for a 36 and 70x60 in. tandem compound Bass Corliss engine used in the rod mill of the New Castle Wire Nail Co., and eight pieces, make two wheels used to transmit power from two

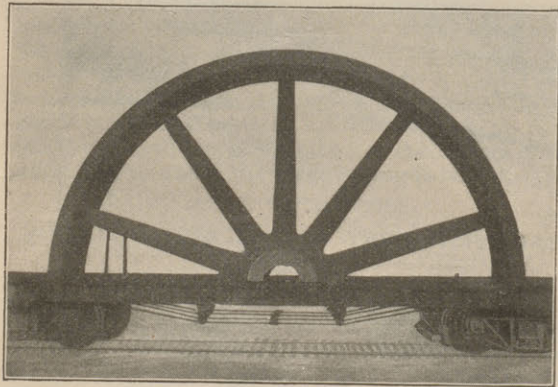


Fig. 1.—WHEEL LOADED FOR SHIPMENT.

28 and 50x60 in. cross compound Bass Corliss engine, which supply power for the large tin mill owned by the New Castle Steel & Tin Plate Co., this company being a pioneer in substituting rope wheels for usual gearing. It is stated that this is the first instance where rope drives have been used on so large a scale for such service and it is believed that superior work will be produced, as the power is steadier and the annoying "back-lash" which is inevitable with gears will be avoided. In addition to this, the extensive accidents which are of frequent occurrence when gearing is employed, will be obviated. These wheels are grooved for 2 in. ropes, of which they carry 32. The sections of the wheel are bolted together at the rims by  $1\frac{1}{2}$  in. bolts. One of these castings weighs 40,000 lbs. and the height upon the cars, which by the way are low ones, was 16 ft. from the level of the rail to the top of the rim of the wheel.

#### INTERLOCKING SIGNAL RULES.\*

##### FIXED SIGNALS.

*Interlocking Signals.*—1. Interlocking signals are of the semaphore, pattern, consisting of posts with movable arms pointing to the right. Train movements are governed by the position of the arm by day and by the color of the lights by night. The position and form of the arms or the color of the lights displayed indicate danger, caution or safety.

2. The home signal placed at or near the danger point has one or more arms with straight ends painted red with a white stripe on front side.

3. High home signals except at junction points may have two arms on the same post. The upper arm governs the movement of trains along the main or high speed route. The lower arm along diverging route or routes.

3a. At junction points three arms may be used. The upper arm governs the movements of trains along the main or high speed route, the middle arm the route of secondary importance and the lower arm all other diverging routes.

4. The low or dwarf home signal has a single arm on a post not over five feet high and governs movements of trains from side track to side track, side track to main track, and main track against the normal direction of traffic.

4a. When the arm on a single arm home signal post is in a horizontal position or a red light displayed or when all of the arms on a two or three arm home signal post are in the horizontal position or all red lights displayed, it indicates danger, and signal must not be passed when in this position excepting as per Rule 13. When the arm on a single arm home signal post or one of the arms on a two or three arm home signal post is inclined downward to an angle of 60 deg. or more, or a white (or green) light displayed it indicates safety and trains can proceed.

5. The distant signal placed about 1,200 ft. from the home signal has an arm with forked end, painted green on front side with white stripe. When the arm is in horizontal position or a white (or green) light displayed, it indicates caution. A train must be so controlled that it may be stopped before reaching the home signal. When the arm is inclined downward to an angle of 60 deg. or more, or a white or green light displayed it indicates safety or that the home signal or signals for the high speed route are clear.

6. The back view of a signal in no case governs a train movement. The rear side of all signals is painted white with black stripe.

7. When two or more parallel tracks are to be governed, the signal may be placed on a bracket post. The posts carrying the signals stand in the same relative position as the tracks governed.

8. Signals are located to the right of the normal direction of traffic on single or bracket posts or on bridges over the tracks. (Note. Any exception to this rule will be covered by special order.)

10. A signal is given for each movement to be made. After receiving a signal to pass in one direction a movement must not be made in the opposite direction without receiving the proper signal for such movement.

11. Movements to or from side tracks or against the normal direction of traffic must be made with the train under control.

12. When a signal is not visible or the arm not inclined downward to an angle of at least 60 degrees or the light not shown, or a white light shown when a red or green light should be shown, it indicates danger. Train must not proceed until every precaution is taken to insure safety and the trouble must be promptly reported to the proper officer.

13. If signals are out of order or if a movement is to be made that is not signaled, train must be brought to a stop and only proceed through the limits of the interlock-

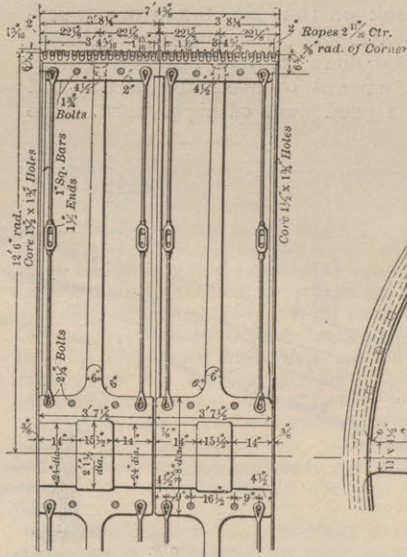


Fig. 2.—PRINCIPAL DETAILS OF WHEEL.

ing by taking every precaution in accordance with instructions from the leverman.

14. Flying switches must not be made over interlocking switches.

15. The use of sand or wasting of water must be avoided within the home signal limits of the interlocking.

16. No engine, train, or portion of train must be allowed to stand for any length of time within the home signal limits of the interlocking.

17. When there is switching to be done at an interlocking, the trainmen must in no case cut their train in two before stopping, but must bring the train intact to a stop outside of the home signal.

#### GENERAL RULES GOVERNING THE OPERATION AND MAINTENANCE OF INTERLOCKING PLANTS.

*Operation.*—1. All signal arms must be kept normally in the horizontal position and must not be cleared for an ap-

\*A report of the committee to the Railway Signaling Club presented March 10, 1896 to be discussed at the meeting of May 12, 1896.

proaching train until such train is within a mile of the crossing. When necessary for the leverman to be absent from the tower, signals must be left as directed by special order.

2. A signal must not be given until it is known that the route is clear.

3. Immediately after operating a signal lever, the signal must be observed to be in working order, and it must be known that it has assumed the proper position.

4. After clearing signals for an approaching train, the signals must not be changed, except as per Rule 5, until after the train has passed beyond the home signal limits of the interlocking, unless the train shall have come to a stop outside of the home signal. No distinction must be made between passenger and freight trains under this rule.

5. Signals may be taken away from a train at any time, provided the leverman discovers anything that might endanger the safe running of the train.

6. When necessary to flag a train through the limits of an interlocking, the signal must be given from some point on the track, so there may be no misunderstanding as to which train is to move. If there is but one train in sight, signals may be given from the tower.

The signals for this purpose must be given only by green flag or light.

7. When a route is signaled in one direction only, and a movement is necessary in the opposite direction, over that route, the signal lever governing the route must be unlatched to insure that the route is set. Said lever must then be put in the normal position and the train flagged through the limits of the interlocking.

8. When a switch or derail is out of order so that it cannot be operated and locked from the machine, the signal or signals that protect such defective part must be kept at danger. When a movement is to be made over the route or routes affected the defective switch or derail must be spiked for the desired route and the signal lever or levers governing the route must be unlatched to insure that the route is set. The train must then be flagged through the limits of the interlocking. In such a case, trains that are to make movements over conflicting routes must be brought to a stop before the home signal is cleared for them.

9. When a signal arm fails to assume the horizontal position when the operating lever is put in the normal position, no switch or derail must be moved or conflicting signal cleared until the arm of the defective signal has been put in the horizontal position. Said defective signal must not be operated for a train until it is known to be in good working order.

10. When the signal is out of order, the arm must be kept in a horizontal position, before flagging a train past such signal, its lever must be unlatched to insure that the route is set.

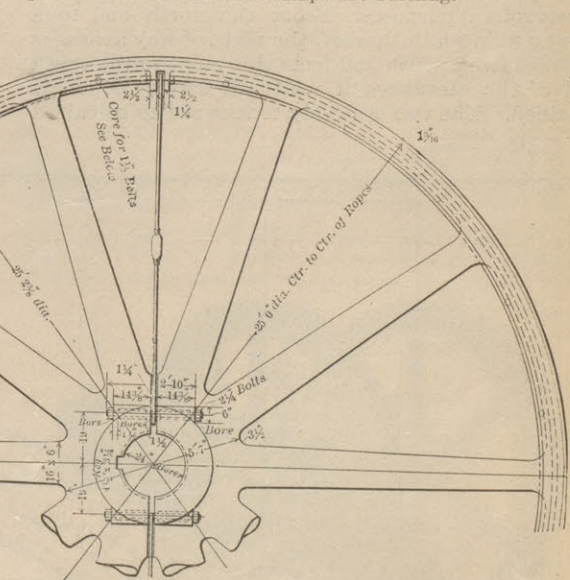
11. When there is a defect in the machine or locking making it possible to clear a signal with a switch derail, or lock in the wrong position or a conflicting signal clear, the signal or signals affected must be kept at danger and train must not be flagged past such signal or signals until the leverman is sure that the route is set.

12. In case a signal light goes out said signal must be kept at danger and train stopped from such a cause must be flagged through the limits of the interlocking, the lamp must be relighted at the first opportunity.

13. A switch or detector bar must never be moved when a train covers or is closely approaching it.

14. Levers must be handled with a steady movement. Levermen will be held responsible for any damage occasioned by rough handling. If a lever moves unusually hard or with unusual ease, the cause must at once be investigated. An attempt to force a lever must never be made.

15. Signals must be observed frequently during the night to ascertain that the lamps are burning.



16. During freezing weather the levers must be moved frequently to prevent the connections from freezing in.

17. Lights must be displayed from one hour before sunset to one hour after sunrise and when from fog or other cause day signals cannot be seen clearly.

18. Lights must not be placed in the tower where they can be seen from an approaching train.

19. Levermen on duty must not leave the tower except in case of absolute necessity.

20. Unauthorized persons must not be permitted in the tower.

21. In case of an accident or damage to any part of the apparatus the proper officer must be notified immediately.

22. During the day if an arm is removed from a post, trains must be stopped by flagman placed in advance of the signal affected and must be flagged through the limits of the interlocking in accordance with instructions from the leverman.

23. At night if the red glass in a home signal is broken the signal must be kept in the danger position and a red lantern must be substituted for the regular lamp. Train

stopped at said signal must be flagged through the limits of the interlocking.

24. At night, if the caution glass in a distant signal is broken, the signal must be kept in the cautionary position and a lantern displaying a caution light must be substituted for the regular lamp.

25. Enginemen running their train past a danger signal, using sand or wasting water within the home signal limits of the interlocking must be reported to the proper officer.

*Maintenance.*—26. The plant must be inspected daily.

27. All studs in crank stands, compensators, detector bars, etc., and all bolts and nuts must be kept tight. Cotters must be kept in place and properly spread. Crank compensator, and other foundations must be kept rigid and all boxing must be kept in good repair.

28. All wire and pipe line connections must be kept in proper adjustment.

29. Glasses and lenses must be inspected daily. They must be kept in a clean condition. If any are cracked or broken they must be replaced at once.

30. Switches must be inspected daily while in operation to see that the points fit up and are properly locked.

31. Home signal arms for the danger position and distant signals for the caution position must stand at right angle to the post and either must stand at an angle of 30 degrees or less to the post when clear. Arms must be washed whenever the color of some becomes obscured by dirt.

32. Any part of the apparatus becoming so worn as to endanger the safe working of the plant must be renewed at once.

33. All moving parts of the plant must be kept oiled and free from grit. Care must be taken not to use too much oil and all the old oil must be removed before re-oiling.

34. The tower must be kept in a neat and orderly condition and tools and hand signals ready for immediate use.

35. Lamps must be cleaned and filled daily. They must be lighted at least ten minutes before being taken from the lamp room in order to properly regulate the flame.

power of the New York Central & Hudson River Railroad in the inspection locomotive Hudson, which was built for use on that road, the design having proved to be very satisfactory in service. The locomotive is of the eight-wheel type, with a wagon top boiler, the outside diameter of the first ring of which is 42 in. The boiler and engine, owing to their lightness, are somewhat similar in appearance to the designs of eight-wheel engines about 20 years ago, and yet the engine is modern in every respect. The cylinders are 14 x 22 in., the driving wheels 62 in. in diameter and the boiler pressure 180 lbs. The valves are of the American balance type with the latest improvements of the American Balance Slide Valve Co., of Jersey Shore, Pa. The engine is equipped with Westinghouse automatic air brakes for drivers, tender and train. It also has the American engine truck brake and Westinghouse air signal. The boiler is lagged with magnesia sectional covering. Two Williams round case head lights have been furnished and the Leach sand feeding apparatus; the Gould coupler is carried on the pilot and rear of the tender. The Le Chatelier water brake is applied to the cylinders and the consolidated steam car heating apparatus, and the Boyer speed recorder are also used. The tender frame is of 6½ x 4 x ½ in. angle iron and built according to the Schenectady Locomotive Works' standard, as are also the tender trucks which are center bearing with channel irons and diamond frames. The engine truck has a rigid center and four wheels. The following table gives the chief dimensions of the locomotive:

Fuel.....	Bituminous coal
Weight, in working order.....	78,800 lbs
Weight on drivers.....	49,700 lbs
Driving wheel base.....	7 ft. 4 in
Total wheel base.....	20 ft. 10 in

Smokestack, straight.....	Inside diam 11½ in
Height of stack above the rail.....	14 ft 3 in
Injectors.....	Two, Monitor No. 6
Tender—	
Weight empty.....	33,250 lbs
Number of wheels.....	8
Diameter of wheels.....	33 in
Journals.....	4½ x 8 in
Wheel base.....	13 ft 11½ in
Water capacity.....	2,500 gal
Coal capacity.....	5 tons
Total wheel base, engine and tender.....	41 ft 1 in
Total length, engine and tender.....	48 ft 7 in

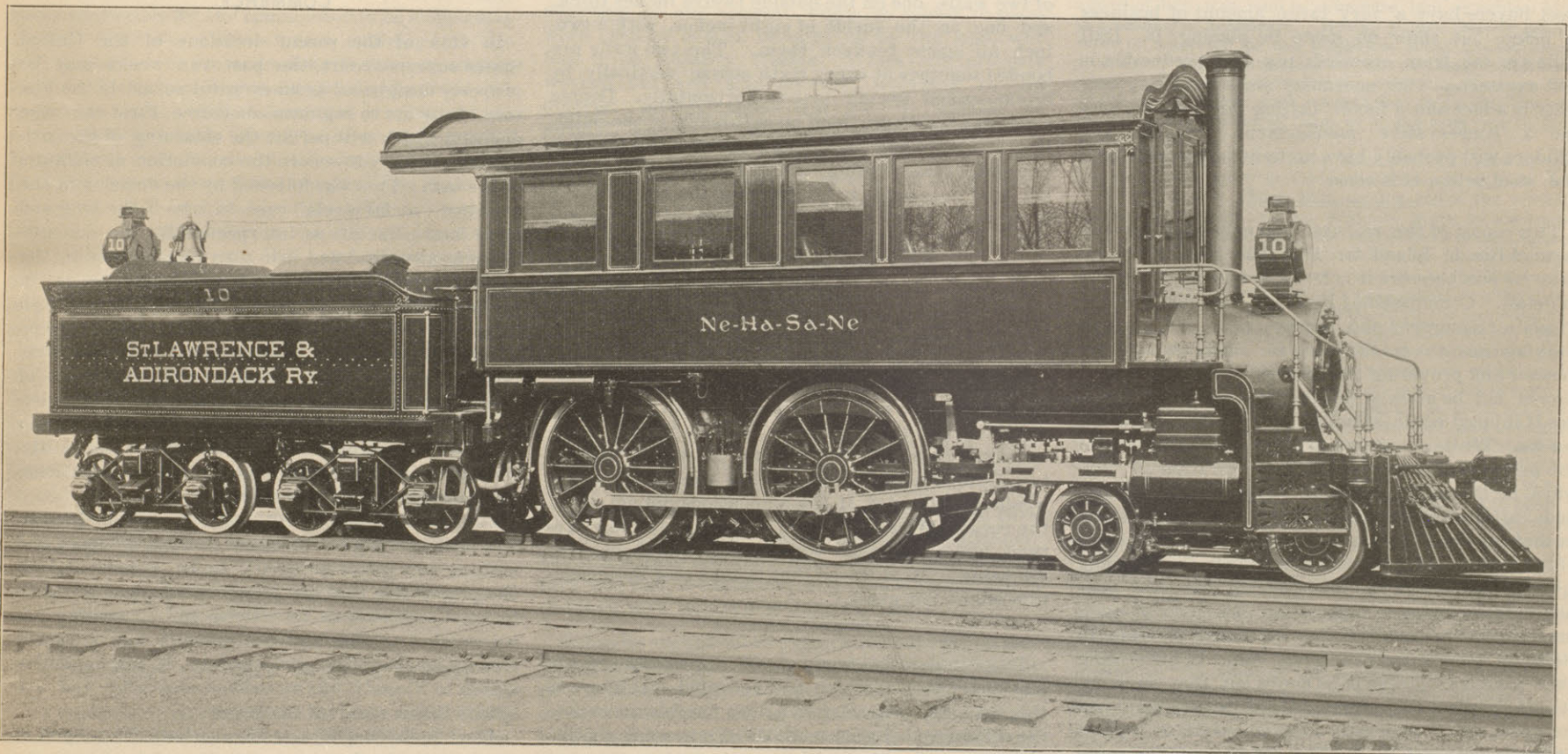
We are indebted to Mr. William Buchanan and to Mr. A. J. Pitkin for the information presented, and the photograph of the locomotive.

#### Hotel Accommodations at the Conventions.

Among the hotels at Saratoga, which will open for the June conventions, is the Clarendon, of which Mr. Edward P. Harris is the proprietor. Mr. Harris is well-known to railroad men through his former connection with the Tift and Genesee houses at Buffalo, the Gilsey house, New York, and the De Sota at Omaha. A rate of \$2.50 per day will be made at this hotel for all those attending the conventions, and special attention will be given to their entertainment and comfort. Mr. Harris hopes to welcome many of his old friends at the Clarendon, which is directly opposite to the convention hall in which the meetings will be held.

#### American Railway Association.

The spring meeting of the American Railway Association will be held at the Burnett house, Cincinnati, Ohio, on Wednesday, April 15, 1896, at 11 a. m. Reports will be



SCHENECTADY INSPECTION LOCOMOTIVE FOR THE ST. LAWRENCE & ADIRONDACK RAILWAY.

36. Any damage to the plant must be immediately investigated, and tracks and switches in a desired route must be put in a safe condition before allowing a train to pass.

37. If a signal switch or derail in a drawbridge interlocking plant fails to operate the connection to said defective part must be disconnected at the first split link or pin and jaw coupling beyond the draw, in order that the bridge coupler may be free when the bridge is to be swung.

38. Tampering with the machine locking will not be allowed. Any defects in the locking must be reported to the proper officer immediately.

39. A report of the condition of the plant including any trouble with lamps must be sent daily to the proper officer or at the end of each week as may be ordered. A tool and material report must be sent to the proper officer at the end of each month.

40. Ignorance of these rules will not be taken as an excuse for any disregard of them.

#### INSPECTION LOCOMOTIVE—ST. LAWRENCE & ADIRONDACK RAILWAY.

The accompanying illustration is taken from a photograph of an inspection locomotive recently built by the Schenectady Locomotive Works for Mr. W. S. Webb, president of the St. Lawrence & Adirondack Railway. The engine is designed particularly for inspection purposes and has sufficient power to take President Webb's private car, which weighs 120,000 lbs., over the heaviest grades on the line. The inspection room, which is a continuation of the cab, is nicely finished in mahogany, carpeted, and furnished with chairs for six passengers. The general features of the engine are the same as those employed by Mr. William Buchanan, superintendent of the motive

Cylinders—	
Diameter.....	14x22 in
Diameter of piston rod.....	2¼ in
Piston packing.....	Cast iron rings
Rod packing.....	United States metallic
Steam ports.....	12x1½ in
Exhaust ports.....	12x2½ in
Bridges.....	1½ in
Valves—	
Kind of.....	Allen American balance
Travel.....	5 in
Outside lap.....	15-16 in
Inside clearance.....	1-16 in
Lead of valves in full gear.....	1-16 in. lead, forward, ¼ in. back motion
Valve stem packing.....	U. S. metallic
Wheels, etc.—	
Driving wheels outside of tire.....	62 in. diam
Material of centers.....	Cast steel
Tire held by.....	Shrinkage and retaining rings
Driving boxes.....	Steeled cast iron
Driving journals.....	6½ x 8 in
Main crank pin journals.....	4 x 4 in
Side rod pin journals.....	3½ x 3¼ in
Engine truck journals.....	5 x 8 in
Engine truck wheels.....	28 in
Kind of truck wheels.....	Krupp cast iron spoke center with retaining rings
Boiler—	
Outside diameter of first ring.....	42 in
Working pressure.....	180 lbs
Plates in barrel and outside fire-box.....	7-16 in. and ¼ in
Plates in throat.....	¾ in
Horizontal seams, quadruple riveted with welt strip in and out, butt joints	
Fire-box—	
Length.....	58 3-16 in
Width.....	34½ in
Depth.....	56 in
Plates, Sides, 6-16 in.; back 5-16 in.; crown ¾ in.; tubesheet ¾ in	
Water space.....	Front 4 in.; sides and back 3 in
Staying, crown bars.....	4½ x ¾ in
Stay bolts.....	¾ x 1 in. diam
Number of tubes.....	128
Diameter of tubes.....	2 in
Length over tubesheets.....	10 ft 7 in
Fire brick arch.....	Supported on studs
Heating surface—	
Tubes.....	703.7 sq. ft
Fire box.....	80.0 sq. ft
Total, grate.....	783.7 sq. ft
Grate.....	13.89 sq. ft

presented by the following committees: Executive committee; committee on train rules; committee on car service; committee on safety appliances; joint committee on interlocking and block signals; committee on general regulations for employees; nominating committee; and committee on standard wheel and track gauges. The annual election of officers will take place at this meeting. Two members of the executive committee, three members of the committee on train rules, and three members of the committee on general regulations for employees, will also be elected.

Companies may be represented by their president, vice president, general manager and general superintendent, or by any official or officials connected with the transportation or traffic department. All such officers connected with railway companies that are members of the association are invited to be present.

**ELECTRO-PLATING A SHIP'S BOTTOM.**—The new process designed to prevent corrosion and the accumulation of barnacles, an illustrated description of which was given in the RAILWAY REVIEW of Feb. 9, 1895, (page 76) has recently been tried at Jersey City on the iron tugboat Assistance. In the process the copper was deposited from baths about 5 ft. square and 18 in. deep, shaped so as to fit the curvature of the hull. The baths were applied three times, each time with a different solution. The first solution is an acid, used simply for cleaning the surface from oxide, the second is of cyanide of copper, and the third of sulphate of copper. The first two baths remain on the vessel for about 24 hours each, and the last bath four days or longer. For the cyanide solution a current of 6 volts and 900 amperes is used, and for the sulphate solution 3 volts and 900 amperes. The copper deposit is about 1-16 in. thick, and perfectly smooth and regular. The baths are placed in such positions that the deposits overlap each other on the edges, insuring the absence of joints.

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CHICAGO, SATURDAY, APRIL 4, 1896.

THE steel and iron makers are living in hopes. Lake ores are fixed at the high combination level long threatened and coke holds its own far above what buyers regard as a fair market price. The busiest mills are the plate iron mills. Steel billet makers predict a rush of orders. The merchant bar mills are quieter than for a month. Structural steel buyers have a very large amount of business to place, but show no haste in placing it. Rail mills are far from crowded; pig iron production is still excessive. Our enormous steel producing capacity is a fact and a factor calling for a strong arm and a conservative management. Buyers and builders will probably have no fault to find with iron and steel prices this year.

THE report of the railroad commissioner for the state of Rhode Island for 1895 has been received. Like its predecessors it is frank in tone and complete in detail. Commissioner Freeman does not hesitate to again recommend the passage of a law making walking upon the tracks of steam railroads a misdemeanor and providing that any person so trespassing should not be allowed to enter any action for damages if injured while standing or walking upon the tracks. While strenuous to maintain the rights of the public in connection with the operation of railways, he is frank enough to acknowledge that he finds railroad officials desirous of doing everything in their power to promote the safety and convenience of the public. He also comments upon the freedom from strikes among the roads during the past year and takes occasion to suggest the influence of such provisions as is made by the Baltimore & Ohio in its relief department as of great value in preventing such troubles. There is no doubt but that such institutions affect the rank and file of railway employes for good, and if generally adopted would to a great extent counteract the radical efforts of the more reckless class of employes.

THE lengths to which trade unionism sometimes goes supplies many a text as to the danger of unchecked authority. A recent case is that of the stevedores' union which proposed to inaugurate a strike because five bales of goods were hoisted from the hold of a vessel at one time, instead of four, as prescribed by the union. These stevedores work by the hour and the men objected to heavier slinging because increasing the number of packages at each hoist meant the reduction of hours occupied in unloading. The vessel in question used a steam hoist so that the element of time was the only one affected. Had the compensation for unloading been upon a tonnage instead of the time basis, the case would undoubtedly have been reversed, and the sling loads would have been increased to the extent of the power of the steam hoist to handle them. No objection can be made to the effort of the laboring man to obtain or his labor all that is possible, provided he works injustice to no one else. In the case in question, while it would undoubtedly be better to work by the piece or ton instead of by the hour and thus reap the fruit of extra effort, the desire to increase, or at least not decrease his aggregate pay, is both natural and right. But the steamboat is a plant of large cost and every hour's delay means a reduction of earning capacity and an added expense for interest, something which the stevedore has no right to impose. If by increasing its sling loads twenty per cent, a material saving could be effected for the steamboat, no objection should be made by the laboring men, al-

though provision should at the same time be made for increasing his rate of compensation so that it would aggregate the same as with the slower handling. Any proposition that takes account of only one side of the labor question cannot but fail regardless of the source from which it emanates and the sooner the acceptance of the principle of reciprocal obligation becomes general, the sooner will the solution of the labor problem be found.

AN English contemporary some time ago told of a number of troubles which had been experienced at a central electric lighting station in London owing to the excessive vibrations which were set up by the rapidly running engines. The trouble extended so far from the building in which the machinery was housed as to render damage suits a serious matter. The solution determined upon as nearly as can now be recalled was the substitution of impulse engines of the steam turbine form for those of the reciprocating type. The vibration must have been stopped, as nothing has been said about it recently. Some paragraphs in the paper by Mr. H. W. York upon the "Twenty-eighth Street Central Station" of New York, recently read before the American Society of Civil Engineers, illustrates a method of preventing such vibration by insulation when a building is being constructed. The structure described has a steel frame with a brick filling in the walls. The entire front wall is hollow and is carried up above the roof to prevent the noise of the machinery from annoying the patients in a hospital which is directly across the street. The wall on this side is really composed of two walls, one on the outside twelve inches thick, and one on the inside of eight inches, with a two-inch air space between them. The two walls are bonded together at every sixth course vertically by bricks spaced twenty inches horizontally. Double windows are also provided upon this side of the building, and the whole arrangement has been found so successful that standing directly in front of the building it is impossible to tell whether the machinery is in motion or not. The foundations of the engines rest on solid rock, and to prevent any communication of vibration from the foundations of the building to others adjacent, the foundation walls are kept one inch clear of all others surrounding them, and care was also taken to insulate the brick walls of the power house from other buildings. This proves that where bed rock can be had for the footing of foundations, vibration may be overcome with proper construction, and the experience in New York is a valuable record in this connection. It would be of interest, however, to know whether the same success would be obtained if the foundations did not reach the rock. Would the earth communicate the vibrations under the walls without the walls themselves vibrating. It is feared that in that case the insulation might not avail.

THE comparative trials of two well-known types of stationary boilers which are recorded elsewhere in this issue call attention in a very forcible manner to the difference between methods of operating similar plants in connection with manufacturing concerns and railways. Here we have a large manufacturing concern using a total of nearly 3,500 horse power of boilers in two large batteries in which blast furnace gas is used for fuel, a case in which if anywhere indifference to the comparatively slight difference of efficiencies of boilers might be considered excusable, especially when either type of boiler used might safely be considered to be up to the best current practice. In such a case it might be considered that the waste blast furnace gases cost nothing as, if they were not employed under the boiler they would be allowed to run to waste, which was the case formerly. It has been found necessary in this branch of manufacturing business to look sharply after the odds and ends, and attention to these same little details is equally important in railway operation in which competition and low rates are quite as effective as in manufacturing lines. To quote again from Mr. A. C. Bird's communication to the New York Railroad Club with reference to the large car problem: "There is hardly room for doubt that the net profits which go to the stockholders are nothing more than the aggregate of minute economies that result from modern improvements. If this is not wholly so to-day, it will be in the near future." While it is not by any means a new and fresh utterance, it is felt that this is an opportunity to compare steam boiler practice in railway shops with that of large manufacturing concerns like the one referred to at Pittsburgh. It is too often thought that anything that will boil water under pressure is adapted to fill all the requirements of steam plants of railway shops. At present many

shops are supplied with steam from old locomotive boilers or boilers of the locomotive pattern which are built at the shops themselves. No doubt whatever exists of the ability of such boilers to furnish the requisite amount of steam; so far so good, but the question of how much that steam costs is very seldom asked, and it seems pertinent to observe that if a saving of a few per cent in evaporating efficiency at a large manufacturing plant, is worth while under the conditions stated, it is strange that more attention is not given to the larger savings which might be made in many shop plants. This may be harping on an old theme, but one must be impressed with the necessity for it by visiting many of even the best equipped shops on our railways. No body offers anything but words of commendation for efforts to produce pneumatic power to better advantage, and while upon this line, why not go further and attack the steam making power which is at the root of matters in economy of shop practice. Upon some roads, this is being done universally and upon others difference as great as twenty-five per cent exists between boilers in different parts of the same plant. Suppose the bill for fuel required in heating shops and running stationary engines to amount to two hundred thousand dollars per year as it does on a number of large roads, a saving of twenty-five per cent would mean fifty thousand dollars per year which it will be admitted, is not insignificant and this would seem to clinch the argument favoring better boiler plants for stationary purposes.

## COURT DECISIONS AND THE ACT TO REGULATE COMMERCE.

In view of the recent decisions of the United States supreme court, the past two weeks may be properly designated as an eventful period in the history of the act to regulate commerce. First came the decision which will permit the obtaining of the evidence necessary to secure the conviction of violators of the law. This was followed by the decision in the so-called "social circle" case, in which the long and short haul principle as interpreted by the commission was sustained and it in turn was followed by the import rate case which declares the law to be in harmony with the principle upon which through rates have for years been predicated. These decisions are of such importance as to warrant their publication in our columns, citations and statements of fact being omitted for want of space. If to these decisions shall be added the one involving the basing point system as used in the southern states, a distinct advance in the way of governmental regulation of commerce will have been made.

The question of compelling testimony has heretofore been thoroughly discussed in these columns and nothing now seems necessary to be added. Indeed the proposition that one person could plead a constitutional provision as an excuse for concealing not his own but another's offence, when it was apparent that by no possibility could an iota of responsibility attach to himself, was an evident absurdity and the sooner it was removed the better.

The "Social Circle" case has also been the subject of comment by this journal and the line of the decision in question follows almost exactly the opinion expressed. There may be considerable room for doubt as to whether the long and short haul clause of the law is a wise regulation, but there cannot be any room for doubt that the construction put upon it by the commission in the case in question and now sustained by the supreme court is altogether within its meaning. The arguments on this subject proceed from two different standpoints. If a railroad is a private property, manufacturing a commodity called transportation, which is perishable if not used at the time of manufacture; and if a railroad has no other responsibility to the public than that of a private person there is little doubt but that the act to regulate commerce is a menace to, if not an actual transgression of its rights. But if the conduct of transportation is primarily a public function and only incidentally a means of private gain, then there would appear to be no question not only as to the legitimacy of the law but also the construction put upon it by the commission and confirmed by the court.

The second point made by the court in this case is not less important than that already referred to. It will be noted that in effect the court holds that where a road lying wholly within one state accepts traffic from a connecting line which originates without the state, thereby comes under the supervision of the Interstate Commerce Commission, and is debarred from exempting any portion of its line from such supervision on such traffic. The point turns upon what constitutes a continuous shipment. There is a sharp distinction made between a shipment which is intra-state and merchandise originating outside of

the state in which it is offered for transportation. The court rules that a consignment of goods offered by a shipper (not a connecting carrier) on which there exists no contract for carriage to the designated destination was properly exempt from the provisions of the interstate commerce law; whereas, a consignment under contract for transportation to any point is held to be an interstate shipment for the entire distance irrespective of the fact that a road entering into such transportation may be wholly located within a single state, and may charge for its service and its local state rates. Incidentally, it may be observed that this ruling has an important bearing upon the transit privileges so common throughout the west. It will be difficult for railroads to treat as a continuous shipment wheat originating in Dakota consigned to Minneapolis, and exchanged for flour of equal weight for transportation to a more distant point.

Perhaps the most important point in the decision is that which holds from the commission the power to prescribe rates. It is admitted that the question of reasonableness is properly determinable by the commission, but that the act to regulate commerce does not confer the power to fix rates. The position has been taken by this journal, and which seems to be supported by the decision, that it was fairly within the province of the commission not only to determine whether a given rate was or was not reasonable, but also to prescribe the limit of reasonableness; that is to say, to fix a maximum and minimum beyond which carriers might not go but within which they were at liberty so far as the question of reasonableness is concerned to fix their own rates. It is manifestly impossible for the commission to be sufficiently advised of all the circumstances entering into the case to enable it to prescribe definite rates on certain traffic. The influence of a rate is so widespread and reaches to traffic which at first sight is apparently so remote as to be wholly beyond its reach that it would be necessary in each case to take into consideration the entire rate system of the country. No doubt the commission will be glad to escape such a responsibility. It is evident that in its rulings heretofore made in this connection it has acted from a sense of duty rather than from any disposition to assume any additional or doubtful prerogatives, and that it will gladly forego any further labor in that direction.

The court also takes occasion in this same decision to express its disapproval of the methods of procedure so frequently adopted by the railroads of withholding when before the commission evidence vital to the case and afterwards presenting such evidence before the court. This expression of disapproval should have a marked influence upon congress in connection with the pending amendment of the act to regulate commerce, which will effectually prevent such practice.

The decision in the import rate case and some comments thereon will be presented next week.

#### THE BASIS OF PIECE WORK SYSTEMS.

An addition to the literature of piece work which is of a very practical nature was presented in the form of a paper to the Western Railway Club, read at the March meeting by Mr. G. L. Potter, and which was reproduced nearly in full in our issue of last week. The piece work system is growing in favor and while some roads after having adopted it have laid it aside, it certainly seems that the plan itself must be at fault if success is not attained in its use, as there is no question as to the desirability of an arrangement whereby the men receive compensation in accordance with their abilities. This is based upon a recognized factor of social economy, competition, and if a fair arrangement of prices is made, one of the worst results toward which organized labor is now drifting will unquestionably be minimized, if not eventually prevented. There is little work now being carried on about railroad shops which cannot be placed upon the piece price basis. It applies very generally and is adopted with locomotive runners and trainmen where it is eminently successful. The problem is in all cases to fix the rates satisfactorily so that there will be no tendency to cut the price if men are found to be making what might be termed "too good a thing" from their work. It is the rule generally in establishing piece work that prices are so fixed that when the great advantage in output which is induced by the establishment of piece work, brings a man's wages to a high figure as compared to what he was getting on day wages, the employers become frightened and reduce the price, which amounts to a punishment to the man for his efforts to increase the volume of his work.

Much has been written upon this subject, and while the beneficial features of a piece work plan have been urged strongly, enough attention has not been given

to some of the vital points which are necessary to the success of the scheme. Mr. Potter shows the improvement which may be made in removing and replacing a draft rigging to be twenty-one per cent to the company and a gain of forty-four per cent in removing and replacing a body bolster. The proportion saved by piece work in removing and replacing an end sill is over twenty-five per cent. The pay of the workmen is also increased about twenty per cent. The experience with piece work in the shops of the Baltimore & Ohio Railroad where car and locomotive work are both carried out on the piece work plan has been stated as an improvement to the company of getting sixteen per cent more work for the same money and the men receive eight per cent more pay. Piece work therefore offers great inducements and there are good prospects of a large increase in the number of roads which are going into it, and of these it seems advisable to call attention to the fact that a large amount of labor and preparation is necessary in order to carry out any plan to successful completion. Upon the Baltimore & Ohio the plan in use is exceedingly comprehensive and well worked out. The list of prices in use there is very long and shows that an enormous amount of work must have been done by the officers of the mechanical department to complete the arrangements and establish the rates.

The prices are made up for each individual item and the list covers one hundred twenty pages of forms which are issued to the shops for correction four times per year. There lies the difficulty in the changes which are made in the prices. The only objection of any account which is raised to piece work systems is that brought up by the men, who fear to be unfairly treated. When not properly worked out and administered, workmen in industrial establishments are led to oppose it strongly and Mr. F. W. Taylor opened his paper on piece work before the American Society of Mechanical Engineers last summer by the following statement. "The ordinary piece work system involves a permanent antagonism between employers and men, and a certainty of punishment for each workman who reaches a high rate of efficiency. The demoralizing effect of this system is most serious: Under it even the best workmen are forced continually to act the part of hypocrites, to hold their own in the struggle against the encroachment of their employers." These words are from one who has gone thoroughly into the subject and who has arranged a price rate system which seems entitled to be called successful as it has been employed by the Midvale Steel Company of Philadelphia for the past eleven years, during which time the results are said to have been most satisfactory. If readers have not kept Mr. Taylor's plan in mind they will find it explained and commented upon in the RAILWAY REVIEW of July 13, 1895.

It may be argued that a piece rate should not be necessary and that men should be driven to their utmost efforts without any inducement in the form of increased revenues, but as "there is a good deal of human nature in man" this method is without doubt doomed to fall far short of the results which may be obtained by piece work, which seems unquestionably to be the plan of the future. Mr. Potter mentions several important advantages in piece work, namely, a benefit to both parties involved, and also it is a method by which poor men give place to better ones. He also finds that close inspection of work is necessary in order to defend himself against defective workmanship. He realizes the importance of getting at the correct basis of prices, as shown by the following quotations from his paper: "The difference in time required to remove the corresponding parts on different cars (even though they may be of the same design), and the difference in the time required by different men to perform the same work, and the getting out of the parts in small numbers, are the main difficulties encountered in arriving at prices that are fair to both employer and employee. This can be accomplished only by thorough and careful investigation, extending over considerable time and averaging as many performances of the different operations as possible. When the work has been carried through to a successful issue the results will well repay for the labor expended." The last sentence is good testimony. The only way in which failure may result is in neglecting the first fixing of the rate and the maintenance of the rate as long as the conditions upon which the rate was based do not change. The piece work system when "carried out to a successful issue" is one of the best ways offered whereby an employer can do justice to his men and simultaneously he can greatly cheapen the cost of production. The rate making is easily the most important part of any piece work plan. That this, however, is not ap-

preciated even by the men most interested in the cheapening of industrial manufacturing is shown by the fact that in the discussion of Mr. Taylor's paper referred to only one out of fourteen engineers paid any attention to this phase of the question. The cost of doing this part of the work need not be great, but a scheme cannot be completed, nor can it be continued in operation, without showing on the pay rolls in the form of clerk hire. There is no system in use which can be considered as beyond its infancy but the awakening of interest in the subject cannot fail to produce valuable ground for future development.

#### THE RECENT DECISIONS OF THE UNITED STATES SUPREME COURT.

So important and so far-reaching are the decisions recently handed down by the United States supreme court that a knowledge of their general tenure is almost imperative. For that reason it is proposed to publish the opinions (statement of the case and citations omitted) that their force and scope may be fully realized.

##### THE "BROWN" CASE—COMPELLING TESTIMONY.

The case involves an alleged incompatibility between that clause of the fifth amendment to the constitution, which declares that no person "shall be compelled in any criminal case to be a witness against himself," and the act of congress of Feb. 11, 1893, (27 Stat. 443,) which enacts that "no person shall be excused from attending and testifying or from producing books, papers, tariffs, contracts, agreements and documents before the Interstate Commerce Commission, or in obedience to the subpoena of the commission, . . . on the ground or for the reason that the testimony or evidence, documentary or otherwise, required of him, may tend to criminate him or subject him to a penalty or forfeiture. But no person shall be prosecuted or subjected to any penalty or forfeiture for or on account of any transaction, matter or thing, concerning which he may testify, or produce evidence, documentary or otherwise, before said commission, or in obedience to its subpoena, or either of them, or in any such case or proceeding."

The act is supposed to have been passed in view of the opinion of this court in Counselman vs. Hitchcock, (142 U. S. 547), to the effect that section 860 of the revised statutes, providing that no evidence given by a witness shall be used against him, his property or estate, in any manner, in any court of the United States, in any criminal proceeding, did not afford that complete protection to the witness which the amendment was intended to guarantee. The gist of that decision is contained in the following extracts from the opinion of Mr. Justice Blatchford, referring to section 860: "It could not, and would not, prevent the use of his testimony to search out other testimony to be used in evidence against him or his property, in a criminal proceeding in such court. It could not prevent the obtaining and the use of witnesses and evidence which should be attributable directly to the testimony he might give under compulsion, and on which he might be convicted, when otherwise, and if he had refused to answer, he could not possibly been convicted." And again: "We are clearly of opinion that no statute which leaves the party or witness subject to prosecution, after he answers the incriminating question put to him, can have the effect of supplanting the privilege conferred by the constitution of the United States. Section 860 of the revised statutes does not supply a complete protection from all the perils against which the constitutional prohibition was designed to guard, and is not a full substitute for that prohibition. In view of the constitutional provision, a statutory enactment, to be valid, must afford absolute immunity against future prosecutions for the offence to which the question relates."

The inference from the language is that, if the statute does afford such immunity against future prosecution, the witness will be compellable to testify. So also in Emery's case, (107 Mass. 172, 185,) and in Cullen vs. Commonwealth, (24 Gratt. 624,) upon which much reliance was placed in Counselman vs. Hitchcock, it was intimated that the witness might be required to forego an appeal to the protection of the fundamental law, if he were first secured from future liability and exposure to be prejudiced, in any criminal proceeding against him, as fully and extensively as he would be secured by availing himself of the privilege accorded by the constitution. To meet this construction of the constitutional provision, the act in question was passed, exempting the witness from any prosecution on account of any transaction to which he may testify. The case before us is whether this sufficiently satisfies the constitutional guaranty of protection.

The clause of the constitution in question is obviously susceptible of two interpretations. If it be construed literally, as authorizing the witness to refuse to disclose any fact which might tend to incriminate, disgrace or expose him to unfavorable comments, then as he must necessarily to a large extent determine upon his own conscience and responsibility whether his answer to the proposed question will have that tendency. The practical result would be that no one would be compelled to testify to a material fact in a criminal case unless he chose to do so, or unless it was entirely clear that the privilege was not set up in good faith. If, upon the other hand, the object of the provision be to secure the witness against a criminal prosecution, which might be aided directly or indirectly by his disclosure, then, if no such prosecution be possible—in other words, if his testimony operate as a complete pardon for the offense to which it relates—a statute absolutely securing to him such immunity from prosecution would satisfy the demands of the clause in question.

The maxim *nemo tenetur seipsum accusare* had its origin in a protest against the inquisitorial and manifestly unjust methods of interrogating accused persons which has long obtained in the continental system, and until the expulsion of the Stuarts from the British throne in 1688, and the erection of additional barriers for the protection of the people against the exercise of arbitrary power, was not

uncommon even in England. While the admissions or confessions of the prisoner when voluntarily and freely made, have always ranked high in the scale of incriminating evidence, if an accused person be asked to explain his apparent connection with a crime under investigation, the ease with which the questions put to him may assume an inquisitorial character, the temptation to press the witness unduly, to browbeat him if he be timid or reluctant, to push him into a corner, and to entrap him into fatal contradictions, which is so painfully evident in many of the earlier state trials, notably in those of Sir Nicholas Throckmorton, and Udal, the Puritan minister, made the system so odious as to give rise to a demand for its total abolition. The change in the English criminal procedure in that particular seems to be founded upon a no statute and no judicial opinion, but upon a general and silent acquiescence of the courts in a popular demand. But however adopted, it has become firmly imbedded in English as well as American jurisprudence. So deeply did the iniquities of the ancient system impress themselves upon the minds of the American colonists that the states with one accord made a denial of the right to question an accused person a part of their fundamental law, so that a maxim, which in England was a mere rule of evidence, became clothed in this country with the impregnability of a constitutional enactment.

Stringent as the general rule is, however, certain classes of cases have always been treated as not falling within the reason of the rule, and therefore constituting apparent exceptions. When examined these cases will all be found to be based upon the idea that, if the testimony sought cannot possibly be used as a basis for, or in aid of, a criminal prosecution against the witness the rule ceases to apply, its object being to protect the witness himself, and no one else—much less that it shall be made use of as a pretext for securing immunity to others. (Here follows a long list of citations.)

All of the cases above cited proceed upon the idea that the prohibition against his being compelled to testify against himself presupposes a legal detriment to the witness arising from the exposure. As the object of the first eight amendments to the constitution was to incorporate into the fundamental law of the land certain principles of natural justice which had become permanently fixed in the jurisprudence of the mother country, the construction given to those principles by the English courts is cogent evidence of what they were designed to secure and of the limitations that should be put upon them. This is but another application of the familiar rule that where one state adopts the laws of another, it is also presumed to adopt the known and settled construction of those laws by the courts of the state from which they were taken. (*Cathcart vs. Robinson*, 5 Pet. 264, 280; *McDonald vs. Hovey*, 110 U. S. 619.)

The danger of extending the principle announced in *Counselman vs. Hitchcock* is that the privilege may be put forward for a sentimental reason, or for a purely fanciful protection of the witness against an imaginary danger, and for the real purpose of securing immunity to some third person, who is interested in concealing the facts to which he would testify. Every good citizen is bound to aid in the enforcement of the law, and has no right to permit himself, under the pretext of shielding his own good name, to be made the tool of others, who are desirous of seeking shelter behind his privilege.

The act of congress in question securing to witnesses immunity from prosecution is virtually an act of general amnesty, and belongs to a class of legislation which is not uncommon either in England, (2 Taylor on Evidence, sec. 1,455, where a large number of similar acts are collated,) or in this country. Although the constitution vests in the president "power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment," this power has never been held to take from congress the power to pass acts of general amnesty, and is ordinarily exercised only in cases of individuals after conviction, although, as was said by this court in *Ex parte Garland*, (4 Wall. 333, 380,) "it extends to every offense known to the law, and may be exercised at any time after its commission, either before legal proceedings are taken, or during their pendency, or after conviction and judgment."

It is entirely true that the statute does not purport, nor is it possible for any statute, to shield the witness from the personal disgrace or opprobrium attaching to the exposure of his crime; but, as we have already observed, the authorities are numerous and very nearly uniform to the effect that, if the proposed testimony is material to the issue on trial, the fact that the testimony may tend to degrade the witness in public estimation does not exempt him from the duty of disclosure. A person who commits a criminal act is bound to contemplate the consequences of exposure to his good name and reputation, and ought not to call upon the courts to protect that which he has himself esteemed to be of such little value. The safety and welfare of an entire community should not be put into the scale against the reputation of a self-confessed criminal, who ought not, either in justice or in good morals, to refuse to disclose that which may be of great public utility, in order that his neighbors may think well of him. The design of the constitutional privilege is not to aid the witness in vindicating his character, but to protect him against being compelled to furnish evidence to convict him of a criminal charge. If he secure legal immunity from prosecution, the possible impairment of his good name is a penalty which it is reasonable he should be compelled to pay for the common good. If it be once conceded that the fact that his testimony may tend to bring the witness into disrepute, though not to incriminate him, does not entitle him to the privilege of silence, it necessarily follows that if it also tends to incriminate, but at the same time operates as a pardon for the offense, the fact that the disgrace remains no more entitles him to immunity in this case than in the other.

It is argued in this connection that, while the witness is granted immunity from prosecution by the federal government, he does not obtain such immunity against prosecution in the state courts. We are unable to appreciate the force of this suggestion. The act in question contains no suggestion that it is to be applied only to the federal courts. It declares broadly that "no person shall be excused from attending and testifying . . . before the Interstate Commerce Com-

mission . . . on the ground . . . that the testimony . . . required of him may tend to criminate him," etc., "But no person shall be prosecuted or subjected to any penalty or forfeiture for or on account of any transaction, matter or thing concerning which he may testify," etc. It is not that he shall not be prosecuted for or on account of any crime concerning which he may testify, which might possibly be urged to apply only to crimes under the federal law and not to crimes, such as the passing of counterfeit money, etc., which are also cognizable under state laws; but the immunity extends to any transaction, matter or thing concerning which he may testify, which clearly indicates that the immunity is intended to be general, and to be applicable whenever and in whatever court such prosecution may be held.

But even granting that there were still a bare possibility that by his disclosure he might be subjected to the criminal laws of some other sovereignty, that, as Chief Justice Cockburn said in *Queen vs. Boyes*, (1 B. & S. 311,) in reply to the argument that the witness was not protected by his pardon against an impeachment by the house of commons, it is not a real and probable danger, with reference to the ordinary operations of the law in the ordinary courts, but "a danger of an imaginary and unsubstantial character, having reference to some extraordinary and barely possible contingency, so improbable that no reasonable man would suffer it to influence his conduct." Such dangers it was never the object of the provision to obviate.

The same answer may be made to the suggestion that the witness is imperfectly protected by reason of the fact that he may still be prosecuted and put to the annoyance and expense of pleading his immunity by way of confession and avoidance. This is a detriment which the law does not recognize. There is a possibility that any citizen, however innocent, may be subjected to a civil or criminal prosecution, and put to the expense of defending himself, but unless such prosecution be malicious, he is remediless, except so far as a recovery of costs may partially indemnify him. He may even be convicted of a crime and suffer imprisonment or other punishment before his innocence is discovered, but that gives him no claim to indemnity against the state, or even against the prosecutor if the action of the latter was taken in good faith and in a reasonable belief that he was justified in so doing.

In the case under consideration, the grand jury was engaged in investigating certain alleged violations of the interstate commerce act, among which was a charge against the Allegheny Valley Railway Company of transporting coal of the Union Coal Company from intermediate points to Buffalo, at less than the established rates between the terminal points, and a further charge of discriminating in favor of such coal company by rebates, drawbacks or commissions on its coal, by which it obtained transportation at less than tariff rates. Brown, the witness, was the auditor of the road, whose duty it was to audit the accounts of the officers, and the money paid out by them. Having audited the accounts of the freight department during the time in question, he was asked whether he knew of any such discrimination in favor of the Union Coal Company, and declined to answer upon the ground that he would thereby incriminate himself.

As he had no apparent authority to make the forbidden contracts, to receive the money earned upon such contracts, or to allow or pay any rebates, drawbacks or commissions thereon, and was concerned only in auditing accounts, and passing vouchers for money paid by others, it is difficult to see how, under any construction of section 10 of the interstate commerce act, he could be said to have wilfully done anything, or aided or abetted others in doing anything, or in omitting to do anything, in violation of the act—his duty being merely to see that others had done what they purported to have done, and that the vouchers rendered by them were genuine. But, however this may be, it is entirely clear that he was not the chief or even a substantial offender against the law, and that his privilege was claimed for the purpose of shielding the railway or its officers from answering a charge of having violated its provisions. To say that, notwithstanding his immunity from punishment, he would incur personal odium and disgrace from answering these questions, seems too much like an abuse of language to be worthy of serious consideration. But, even if this were true, under the authorities above cited, he would still be compelled to answer, if the facts sought to be elucidated were material to the issue.

If, as was justly observed in the opinion of the court below, witnesses standing in Brown's position were at liberty to set up an immunity from testifying, the enforcement of the interstate commerce law or other analogous acts, wherein it is for the interest of both parties to conceal their misdoings, would become impossible, since it is only from the mouths of those having knowledge of the inhibited contracts that the facts can be ascertained. While the constitutional provision in question is justly regarded as one of the most valuable prerogatives of the citizen, its object is fully accomplished by the statutory immunity, and we are, therefore, of opinion that the witness was compellable to answer, and that the judgment of the court below must be affirmed.

#### THE "SOCIAL CIRCLE" CASE.

Mr. Justice Shiras delivered the opinion of the court.

The investigation before the Interstate Commerce Commission resulted in an order in the following terms:

"It is ordered and adjudged that the defendants, the Cincinnati, New Orleans & Texas Pacific Railway Company, the Western & Atlantic Railroad Company and the Georgia Railroad Company, do, upon and after the 20th day of July, 1891, wholly cease and desist from charging or receiving any greater compensation in the aggregate for the transportation in less than carloads of buggies, carriages, and other articles classified by them as freight of first class, for the shorter distance over the line formed by their several railroads from Cincinnati, in the state of Ohio, to Social Circle, in the State of Georgia, than they charge or receive for the transportation of said articles in less than carloads for the longer distance over the same line from Cincinnati aforesaid to Augusta, in the State of Georgia; and that the said defendants, the Cincinnati, New Orleans & Texas Pacific Railway Company, do also, from and after the 20th day of July, 1891, wholly cease and desist from charging or receiving any greater aggregate compensation for the transportation of buggies, carriages, and

other first-class articles in less than carloads, from Cincinnati aforesaid to Atlanta, in the State of Georgia, than one dollar per hundred pounds."

The decree of the circuit court of appeals, omitting unimportant details, was as follows:

"It is ordered, adjudged and decreed . . . that this cause be remanded to the circuit court, with instructions to enter a decree in favor of the complainant, the Interstate Commerce Commission, and against the defendants, the Cincinnati, New Orleans & Texas Pacific Railway Company, the Western & Atlantic Railroad Company, and the Georgia Railroad Company, commanding and restraining the said defendants, their officers, servants and attorneys, to cease and desist from making any greater charge in the aggregate on buggies, carriages, and on all other freight of the first class carried in less than carloads from Cincinnati to Social Circle than they charge on such freight from Cincinnati to Augusta; that they so desist and refrain within five days after the entry of the decree, and in case they or any of them shall fail to obey said order condemning the said defendants and each of them to pay one hundred dollars a day for every day thereafter they shall so fail, and denying the relief prayed for in relation to charges on like freight from Cincinnati to Atlanta."

It will be observed that, in its said decree, the circuit court of appeals adopted that portion of the order of the commission which commanded the defendants to make no greater charge on freight carried to Social Circle than on like freight carried to Augusta, and disapproved and annulled that portion which commanded the Cincinnati, New Orleans & Texas Pacific Railway Company and the Western & Atlantic Railroad Company to desist from charging for the transportation of freight of like character from Cincinnati to Atlanta more than one dollar per hundred pounds.

The railroad companies, in their appeal, complain of the decree of the circuit court of appeals in so far as it affirmed that portion of the order of the commission which affected the rates charged to Social Circle. The commission in its appeal complains of the decree in that it denies the relief prayed for in relation to freight from Cincinnati to Atlanta.

The first question that we have to consider is whether the defendants, in transporting property from Cincinnati to Social Circle, are engaged in such transportation "under a common control, management or arrangement for a continuous carriage or shipment" within the meaning of language, as used in the act to regulate commerce.

We do not understand the defendants to contend that the arrangement whereby they carry commodities from Cincinnati to Atlanta and to Augusta at through rates which differ in the aggregate from the aggregate of the local rates between the same points, and which through rates are apportioned between them in such a way that each receives a less sum than their respective local rates, does not bring them within the provisions of the statute. What they do claim is that, as the charge to Social Circle, being \$1.37 per hundred pounds, is made up of a joint rate between Cincinnati and Atlanta, amounting to \$1.07 per hundred pounds, and 30 cents between Atlanta and Social Circle, and as the \$1.07 for carrying the goods to Atlanta is divided between the Cincinnati, New Orleans & Texas Pacific and the Western & Atlantic, 75 1-10 cents to the former and 31 1-10 cents to the latter, and the remaining 30 cents, being the amount of the regular local rate, goes to the Georgia company, such a method of carrying freight from Cincinnati to Social Circle and of apportioning the money earned, is not a transportation of property between those points "under a common control, management and arrangement or a continuous carriage or shipment."

Put in another way, the argument is that, as the Georgia Railroad company is a corporation of the state of Georgia, and as its road lies wholly within that state, and as it exacts and receives its regular local rate for the transportation to Social Circle, such company is not, as to freight so carried, within the scope of the act of congress.

It is, no doubt, true that, under the very terms of the act, its provisions do not apply to the transportation of passengers or property, or to the receiving, delivering, storage or handling of property, wholly within one state, not shipped to or from a foreign country from or to any state or territory.

In the answer filed by the so-called "Georgia Railroad Company" in the proceedings before the commission there was the following allegation: "This respondent says that while no arrangement exists for a through bill of lading from Cincinnati to Social Circle, as a matter of fact the shipment from Cincinnati to Social Circle by the petitioner was made on a through bill of lading, the rate of which was fixed by adding this respondent's local rate, from Atlanta to Social Circle, to the through rate from Cincinnati to Atlanta."

The answer of the Louisville & Nashville Railroad Company and Central Railroad & Banking Company of Georgia, which companies, as operating the Georgia railroads, were sued by the name of the "Georgia Railroad Company," in the circuit court of the United States, contained the following statement:

"So far as these respondents are concerned they will state that on July 3, 1891, E. R. Dorsey, general freight agent of said Georgia Railroad Company, issued a circular to its connections earnestly requesting them that thereafter, in issuing bills of lading to local stations on the Georgia Railroad, no rates be inserted east of Atlanta, except to Athens, Gainesville, Washington, Milledgeville, Augusta or points beyond. Neither before nor since the date of said circular have these respondents, operating said Georgia Railroad, been in any way parties to such through rates, if any, as may have been quoted, from Cincinnati or other western points to any of the strictly local stations on said Georgia Railroad. The stations excepted in said circular are not strictly local stations. Both before and since the date of said circular respondents have received at Atlanta east bound freight destined to strictly local stations on the Georgia Railroad and have charged full local rates to such stations—said rates being such as they were authorized to charge by the Georgia Railroad Commission. Said rates are reasonably low and are charged to all persons alike without discrimination."

Upon this part of the case the conclusion of the circuit court was that the traffic from Cincinnati to Social Circle, in issue as to the Georgia Railroad company, was local,

and that that company was not, on the facts presented, made a party to a joint or common arrangement such as make the traffic to Social Circle subject to the control of the Interstate Commerce Commission.

We are unable to accept this conclusion. It may be true that the "Georgia Railroad company," as a corporation of the state of Georgia, and whose entire road is within that state, may not be legally compelled to submit itself to the provisions of the act of congress, even when carrying, between points in Georgia freight that has been brought from another state. It may be that if, in the present case, the goods of the James and Mayer Buggy company had reached Atlanta, and then and there, for the first time, and independently of any existing arrangement with the railroad companies that had transported them thither, the Georgia Railroad company was asked to transport them, whether to Augusta or to Social Circle, that company could undertake such transportation free from the control of any supervision except that of the state of Georgia. But when the Georgia Railroad company enters into the carriage of foreign freight, by agreeing to receive the goods by virtue of foreign through bills of lading, and to participate in through rates and charges, it thereby becomes part of a continuous line, not made by a consolidation with the foreign companies, but by an arrangement for the continuous carriage or shipment from one state to another, and thus becomes amenable to the federal act, in respect to such interstate commerce. We do not perceive that the Georgia Railroad company escaped from the supervision of the commission, by requesting the foreign companies not to name or fix any rates for that part of the transportation which took place in the state of Georgia when the goods were shipped to local points on its road. It still left its arrangement to stand with respect to its terminus at Augusta and to other designated points. Having elected to enter into the carriage of interstate freights and thus subjected itself to the control of the commission, it would not be competent for the company to limit that control, in respect to foreign traffic, to certain points on its road and exclude other points.

The Circuit Court sought to fortify its position in this regard by citing the opinion of Mr. Justice Brewer in the case of Chicago & North-Western Railroad Co. v. Osborne (52 Fed. Rep. 912), when that case was before the United States Circuit Court of Appeals for the Eighth Circuit. It is quite true that the opinion was expressed that railroad companies, incorporated by and doing business wholly within one state, cannot be compelled to agree to a common control, management or arrangement with connecting companies, and thus be deprived of its rights and powers as to rates on its own road. It was also said that it did not follow that, even if such a state corporation did agree to form a continuous line for carrying foreign freight at a through rate, it was thereby prevented from charging its ordinary local rates for domestic traffic originating within the state.

Thus understood, there is nothing in that case which we need disagree with in disapproving the circuit court's view in the present case. All we wish to be understood to hold is, that when goods shipped under a through bill of lading from a point in one state to a point in another, and when such goods are received in transit by a state common carrier, under a conventional division of the charges, such carrier must be deemed to have subjected its road to an arrangement for a continuous carriage or shipment within the meaning of the act to regulate commerce. When we speak of a through bill of lading we are referring to the usual method in use by connecting companies, and must not be understood to imply that a common control, management or arrangement might not be otherwise manifested.

Subject, then, as we hold the Georgia Railroad Company is, under the facts found, to the provisions of the act to regulate commerce, in respect to its interstate freight, it follows, as we think, that it was within the jurisdiction of the commission to consider whether the said company, in charging a higher rate for a shorter than for a longer distance over the same line, in the same direction the shorter being included within the longer distance, was or was not transporting property, in transit between states, under "substantially similar circumstances and conditions."

We do not say that, under no circumstances and conditions, would it be lawful, when engaged in the transportation of foreign freight, for a carrier to charge more for a shorter than a longer distance on its own line, but it is for the tribunal appointed to enforce the provisions of the statute, whether the commission or the court, to consider whether the existing circumstances and conditions were or were not substantially similar.

It has been forcibly argued that, in the present case, the commission did not give due weight to the facts that tended to show that the circumstances and conditions were so dissimilar as to justify the rates charged. But the question was one of fact, peculiarly within the province of the commission, whose conclusions have been accepted and approved by the circuit court of appeals, and we find nothing in the record to make it our duty to draw a different conclusion.

We understand the record as disclosing that the commission, in view of the circumstances and conditions in which the defendants were operating, did not disturb the rates agreed upon whereby the same charge was made to Augusta as to Atlanta, a less distant point. Some observations made by the commission in its report on the nature of the circumstances and conditions which would justify a greater charge for the shorter distance, gave occasion for an interesting discussion by the respective counsel. But it is not necessary for us, in the present case, to express any opinion on a subject so full of difficulty.

These views lead to an affirmance of the decree of the circuit court of appeals, in so far as the appeal of the defendant companies is concerned; and we are brought to a consideration of the appeal by the Interstate Commerce Commission.

That appeal presents the question whether the circuit court of appeals erred in its holding in respect to the action of the Interstate Commerce Commission in fixing a maximum rate of charges for the transportation of freight of the first-class than car loads from Cincinnati to Atlanta.

This question may be regarded as twofold, and is so presented in the assignment of error on behalf the commission, namely: Did the court err in not holding that, in

point of law, the Interstate Commerce Commission had power to fix a maximum rate, and, if such power existed, did the court err in not holding that the evidence justified the rate fixed by the commission and not decreeing accordingly?

It is stated by the commission, in its report, that "the only testimony offered or heard as to the reasonableness of the rate to Atlanta in question was that of the vice president of the Cincinnati, New Orleans & Texas Pacific Company, whose deposition was taken at the instance of the company." And in acting upon the subject, the commission say:

"This statement or estimate of the rate from Cincinnati to Atlanta, (\$1.01 per hundred pounds in less than car loads,) we believe is fully as high as it may reasonably be, if not higher than it should be, but without more thorough investigation than it is now practicable to make we do not feel justified in determining upon a more moderate rate than \$1 per hundred pounds of first-class freight in less than car loads. The rate on this freight from Cincinnati to Birmingham, Ala., is 89 cents as compared with \$1.07 to Atlanta, the distances being substantially the same. There is apparently nothing in the nature and character of the service to justify such difference, or in fact to warrant any substantial variance in the Atlanta and Birmingham rate from Cincinnati."

But when the commission filed its petition in the circuit court of the United States, seeking to enforce compliance with the rate of one dollar per hundred pounds, as fixed by the commission, the railroad companies, in their answers, alleged that "the rate charged to Atlanta, namely \$1.07 per hundred pounds, was fixed by active competition between various transportation lines, and was reasonably low."

Under this issue evidence was taken, and we learn, from the opinion of the circuit court, that, as to the rate to Birmingham, there was evidence before the court which evidently was not before the commission, namely, that the rate from Cincinnati to Birmingham, which seems previously to have been \$1.08, was forced down 89 cents by the building of the Kansas City, Memphis & Birmingham Railroad, which new road caused the establishment of a rate of 75 cents from Memphis to Birmingham, and by reason of water route to the northwest such competition was brought about that the present rate of 89 cents from Cincinnati to Birmingham was the result.

Without stating the reasoning of the circuit court, which will be found in the report of the case in — Fed. Rep. —, the conclusion reached was that the evidence offered in that court was sufficient to overcome any prima facie case that may have been made by the findings of the commission, and that the rate complained of was not unreasonable.

As already stated, the circuit court of appeals adopted the views of the circuit court, in respect to the reasonableness of the rate charged on first-class freight carried on defendant's line from Cincinnati to Atlanta; and as both courts found the existing rate to have been reasonable, we do not feel disposed to review their finding on that matter of fact.

We think this a proper occasion to express disapproval of such a method of procedure on the part of the railroad companies as should lead them to withhold the larger part of their evidence from the commission, and first adduce it in the circuit court. The commission is an administrative board, and the courts are only to be resorted to when the commission prefers to enforce the provisions of the statute by a direct proceeding in the court, or when the orders of the commission have been disregarded. The theory of the act evidently is, as shown by the provision that the findings of the commission shall be regarded as prima facie evidence, that the facts of the case are to be disclosed before the commission. We do not mean of course, that either party, in a trial in the court, is to be restricted to the evidence that was before the commission, but that the purposes of the act call for a full inquiry by the commission into all the circumstances and conditions pertinent to the questions involved.

Whether congress intended to confer upon the Interstate Commerce Commission the power to itself fix rates, was mooted in the courts below, and is discussed in the briefs of counsel.

We do not find any provision of the act that expressly, or by necessary implication, confers such a power.

It is argued on behalf of the commission that the power to pass upon the reasonableness of existing rates implies a right to prescribe rates. This is not necessarily so. The reasonableness of the rate, in a given case, depends on the facts, and the function of the commission is to consider these facts and give them their proper weight. If the commission, instead of withholding judgment in such a matter until an issue shall be made and the facts found, itself fixes a rate, that rate is prejudged by the commission to be reasonable.

We prefer to adopt the view expressed by the late Justice Jackson, when circuit judge, in the case of the Interstate Commerce Commission vs. Baltimore & Ohio Railroad Co., (43 Fed. Rep. 37,) and whose judgment was affirmed by this court, (145 U. S. 263:)

"Subject to the two leading prohibitions that their charges shall not be unjust or unreasonable, and that they shall not unjustly discriminate, so as to give undue preference or disadvantage to persons or traffic similarly circumstanced, the act to regulate commerce leaves common carriers as they were at the common law, free to make special contracts looking to the increase of their business, to classify their traffic, to adjust and apportion their rates so as to meet the necessities of commerce, and generally to manage their important interests upon the same principles which are regarded as sound, and adopted in other trades and pursuits."

The decree of the court of appeals is affirmed.  
[The Import Rate Decision will appear next week.]

## PERSONAL.

Mr. F. W. Boye, Jr., first assistant treasurer of the Big Four at Cincinnati, retired April 1, to engage in business for himself.

Mr. John Gill, formerly general agent of the Fruit Growers' Express, has received the appointment of Pacific

Coast agent of the West Shore Fast Freight Line. He will establish headquarters in San Francisco.

Mr. Ira M. Luddington has resigned as superintendent of the Rochester & Lake Ontario Railroad, his resignation to take effect on April 1.

Mr. Benjamin F. Kaup has been appointed division freight agent of the Baltimore & Ohio, on the Chicago division, to succeed Mr. E. M. Davis, transferred.

Mr. F. S. Higbid, roadmaster of the eastern division of the Erie, with headquarters at Jersey City, N. J., has been promoted to assistant to Chief Engineer O. W. Buchholz.

Mr. H. W. Mallett, who was for a long time connected with the Erie Fast Freight Line Company at Indianapolis, died in the City of Mexico from injuries from an exploding lamp.

Mr. F. A. Brady, for several years agent for the Erie Railroad at Leavittsburg, Ohio, has been promoted to a position with the same company as superintendent on the dock in Cleveland.

Mr. E. L. Northrop, traveling agent of the Nickel Plate fast freight line, has been promoted to the position of agent of the line, with headquarters in Columbus, succeeding Andrew Stevenson, resigned.

Mr. J. C. McKinley has been appointed master of transportation of the Pittsburgh, Shenango & Lake Erie, vice Mr. M. L. Osterhout, resigned. Mr. McKinley was promoted from a passenger conductor.

Ma. W. L. Darling, division engineer of the Northern Pacific, has been appointed chief engineer, succeeding Mr. E. H. McHenry, who is now receiver. The appointment was made by General Manager Kendrick.

It is reported that Mr. John Walker, formerly secretary to Vice President and Traffic Manager Duncan, of the Baltimore & Ohio Southwestern, will succeed Mr. W. W. Peabody, Jr., as assistant to the general manager.

Mr. C. L. Bliss is to succeed Mr. D. L. Patriarch as Reading Dispatch line agent at Saginaw, the latter going to the Michigan Central line. Mr. Bliss was city soliciting agent and will in turn be succeeded by M. B. E. Rose.

Mr. F. E. Patch, general yardmaster of the Ann Arbor at Toledo has resigned after having held that position for seven years. Mr. Patch will be succeeded by Mr. J. E. Burns who has held the position of night yardmaster for the past three years.

Mr. Edwin Dunlop, who since the resignation of Mr. W. A. Garrett, in January, has been acting superintendent of the Terminal Railroad Association of St. Louis, and the St. Louis Merchants' Bridge Terminal Company, has been appointed to fill that position permanently.

It has been announced that Mr. E. M. Davison, division freight agent of the Baltimore & Ohio Railroad, with headquarters at Tiffin, O., will soon be ordered to report at Clarksburg, Va., to take charge of the Wilmington & Bellaire division of the Baltimore & Ohio system.

Mr. C. A. Chambers, general agent of the Cleveland, Akron & Columbus at Cincinnati, has been transferred to Columbus. There he succeeds general agent H. B. Wood, who retires from the service of the company, as the two offices are consolidated, and Mr. Chambers by priority of service remains in charge.

Mr. G. W. Hallock, chairman of the Chicago Local Passenger Association, has resigned to accept the position of city passenger agent of the Northern Pacific Railroad in Chicago. Mr. Hallock has great experience in passenger affairs, but has also had an excellent education in freight affairs on several of the western roads.

Mr. A. S. Ostrander, superintendent of the Air Line division of the New Haven Railroad system, has resigned, and will take the superintendency of a quarry corporation at Meriden. Mr. F. C. Payne, superintendent of the Danbury division, will succeed him. Mr. J. E. Martin, superintendent of the Shepaug, Litchfield & Northern road, will have his duties extended to the Danbury & Norwalk division, with headquarters at Danbury.

Mr. L. F. Moore has been officially named as freight claim agent of the Chicago, Burlington & Quincy road, a position he has virtually filled for a number of years, having had entire charge of the freight claim business of the road. Mr. Moore began railroad work with the Burlington system and has reached his present position through his own efforts and ability. All communications relating to freight claims should be addressed to Mr. Moore.

Mr. Andrew Stevenson, agent of the Nickel Plate fast freight line at Columbus, has been appointed commercial agent of the Baltimore & Ohio in charge of the Baltimore contracting office; Mr. E. M. Davis will be division freight agent, with headquarters at Clarksburg, Va.; Mr. George J. Lincoln is to be division freight agent, with headquarters at Philadelphia; and Mr. J. A. Murray, coal and coke agent, in charge of the traffic east and west of the Ohio river.

A circular has been issued appointing W. R. McKeen, Jr., son of W. R. McKeen, ex-president of the Vandalia, general foreman of the locomotive department. He will continue general foreman of the car shops. A Vandalia official is quoted as saying that there are but few men as young as Mr. McKeen who are so well informed in mechanical arts, several ingenious devices of his invention having been adopted by the Vandalia mechanical and machinery departments.

Announcement has been made that Mr. William Long, formerly assistant engineer of maintenance of way of the Michigan division of the Big Four, had been selected as superintendent of the new bridge of the Big Four at Louisville and to have charge of the terminals of the road at that point. Mr. Long has for some time been a road supervisor on the Michigan division, and is a civil engineer of ability. It is stated that the appointment becomes effective early in April.

The Erie Dispatch has been making some changes and appointments, all of which are effective April 1, as follows: A. C. Hamaker, agent at Philadelphia, vice Comly Jenkins, resigned; John B. Cochran, agent at Cleveland, vice W. B. Wetherell, transferred; W. B. Wetherell, agent at St. Paul, vice G. J. Borup, resigned; Thomas J. Skidmore,

agent at Kansas City, vice W. T. Singleton, resigned; Walter C. Nason, state agent at Davenport, Ia. J. C. Lewis having resigned as agent at Burlington, Ia., that agency is abolished.

Mr. Henry W. Gays, heretofore traffic manager of the St. Louis, Chicago & St. Paul road (the Bluff Line), has been made general manager. General Superintendent I. W. Fowler having resigned, the office has been abolished. Mr. W. G. Galligan is appointed assistant general freight agent, with office at St. Louis, and Mr. E. A. Williams is appointed assistant general passenger agent, also with office at St. Louis. Mr. W. S. Cooke becomes superintendent, with office at Springfield, Ill. All these changes became effective on April 1.

Mr. John Roach, roadmaster of the Cleveland, Akron & Columbus, has tendered his resignation to Acting General Superintendent Sample, and on April 1, will take service with the Erie system as roadmaster of the New York division. Mr. Roach has been connected with the Cleveland, Akron & Columbus just one year, having come from the Chicago division of the Erie system. Mr. Roach's new position is an important one, as the New York division is the best division of that system. A successor to Mr. Roach on the Cleveland, Akron & Columbus has not yet been appointed.

A circular has been issued by General Freight Agent S. T. McLaughlin of the Baltimore & Ohio Southwestern reading: "The following appointments in charge of the freight traffic, except coal and coke, will take effect on April 1, 1896: H. Coope, assistant general freight agent, Cincinnati, O.; Ed Keane, assistant general freight agent, St. Louis, Mo.; H. B. Goddard, division freight agent, Seymour, Ind.; H. A. Truedley, division freight agent, Vincennes, Ind.; E. P. Ruhrah, division freight agent, Chillicothe, O.; J. D. Harney, division freight agent, Springfield, Ill."

The appointment of Mr. I. W. Morris, at present agent of the Wellston & Jackson belt line at Jackson, to the position of chief clerk to Assistant General Freight Agent Mayer, of the Columbus, Hocking Valley & Toledo, has been announced. Mr. Morris was formerly chief clerk in the general freight office of the Ohio Southern at Springfield, and is well spoken of in railroad circles. Another change on this road is the promotion of Mr. Frank Griffith, who has been with the Hocking Valley claim department for a number of years, to the position of chief claim clerk, to succeed Mr. Ed Thatcher, who was recently made traveling freight agent.

Mr. Robt. M. Smith, ticket agent at Hot Springs, Ark., of the St. Louis, Iron Mountain & Southern, has applied for a patent on a new round trip coupon ticket, which he believes, will entirely do away with the handling of such tickets by brokers. The chief improvement over the old descriptive tickets lies in the facts that the punch marks are so separated that they may not mean one of two things, and that a coupon descriptive of the purchaser goes to the agent at which the ticket must be presented for return stamp, which must correspond with the descriptive portion of the ticket itself. Provision is also made for a comparison of signatures.

Although not yet officially announced, it is generally understood that Mr. Edward S. Wasburn, vice president of the Kansas City, Fort Scott & Memphis, is to be appointed president and general manager of that road at the coming meeting of directors in Boston, to succeed the late George H. Nettleton. Other rumored changes on the Memphis are the promotion of General Freight Agent J. J. Fletcher to the position of traffic manager, and the promotion of Assistant General Freight Agent John A. Sargent to the position of general freight agent. The office of the vice president, it is believed, will be abolished.

Mr. Henry M. Keim, vice president, secretary and treasurer of the Cleveland Terminal & Valley road, has resigned, the resignation to take effect April 1. Mr. Keim first entered railroad service as secretary and treasurer and member of the board of directors of the Southern Pennsylvania Iron road in 1867. He has also been a director and receiver of the Cleveland, Wooster & Muskingum Valley and Akron & Chicago Junction roads. He became connected with the Valley in the spring of 1889, when, shortly after the Baltimore & Ohio had secured possession of the property, he was appointed treasurer of the road. He afterwards became secretary also, and in June 1892, was appointed receiver of the road with the late J. K. Bole.

As a result of the hearing of arguments in the suit brought to remove Messrs. Hopkins and Wilson from the receivership of the Louisville, Evansville & St. Louis, those gentlemen were removed from further duty, and Mr. George T. Jarvis appointed single receiver of the road. Mr. Jarvis will take charge of the affairs of the company May 1. His bond was placed at \$25,000. The title of the suit was the American Loan & Trust Co., and Noble C. Butler, trustee, against the Louisville, Evansville & St. Louis Consolidated R. R. Co., Edward O. Hopkins and J. H. Wilson, receivers, the New York Security and Trust Co.; E. P. Hutton and Henry Reis, trustees. General Harrison appeared in the case.

Mr. Charles E. Smart, the general master mechanic of the Michigan Central road, died at his home in Jackson this week, after a very short illness. He was born about 56 years ago in Niles and studied his trade with his father, who then owned one of the largest machine foundries in the western part of the state. He stayed at Niles with his parents until about 1868, when he went to Saginaw, where was located the locomotive department of the Mackinaw, Saginaw & Bay City division of the Michigan Central. Here he obtained a position as fireman and after a short time "firing" was made a locomotive engineer and ran an engine over these divisions about two years. Then the master mechanic of these divisions being transferred, Mr. Smart succeeded to that position. In 1885, May 1, he was appointed general master mechanic with headquarters at Jackson and has filled that position ever since. He had the advantage of a splendid mechanical education and training and was not only one of the most popular men on the road but was a foremost spirit among the mechanical railroad men of the country.

A number of changes are announced in the officials of the Maine Central. Mr. George F. Black will have charge of maintenance of roadway and tracks, and the maintenance of bridges, buildings and other structures on that part of the company's lines north of Portland. He will report directly to the vice president. Mr. Black's title is assistant engineer. Mr. P. M. Watson, bridge inspector, will act as assistant to Mr. Black in the maintenance of bridges, and will report directly to him. Mr. Herbert C. Robinson, assistant engineer, will have charge of the office of the civil engineering department of this company at Portland. The headquarters of these officials will be at Portland. Mr. D. A. Booker will have charge of the maintenance of bridges, and the maintenance of buildings and other structures at Portland and on all the lines of the company east of Portland, with headquarters at Brunswick, Me. He will report directly to the vice president. Mr. Booker's title is bridge inspector. The maintenance of roadway and track, east of Portland, will be in charge of the roadmasters on the various divisions, as at present designated. They will report directly to the vice president.

Mr. John G. Winder, who was known as one of the ablest railroad men in the south, died last week at his home in Raleigh, N. C., of paralysis and heart disease, aged 64 years. Mr. Winder was a native of the state of North Carolina, but first entered railway service with the New York & Erie road in 1850. In 1851 he was made assistant engineer of the Pacific Railroad of Missouri, and in 1853 he went to the Albany & Susquehanna in the same capacity. From 1856 to 1860 he was principal assistant engineer of the Croton aqueduct, N. Y., and then for two years was master of road for the Wilmington & Weldon. In 1868 he became general superintendent of the Wilmington, Columbia & Augusta road, which position he held three years. During the years from 1871 to 1875 he was chief engineer of various roads in North Carolina and in 1875 became general superintendent of the Raleigh & Gaston and Raleigh & Augusta roads. Of these two roads, together with the Carolina Central, he became general manager in 1882, remaining in that office until 1890, when, at the consolidation of these and other lines into the Seaboard Air Line, he was made general manager of the whole, later holding the office of vice president as well. Mr. Winder was a graduate of West Point.

Mr. C. M. Higginson of the Chicago, Burlington & Quincy road has been appointed assistant to the president of the Atchison, Topeka & Santa Fe road. To quote the circular of appointment, he "will have immediate supervision of all coal properties in which the Santa Fe is interested and will perform such other duties as may be assigned to him by the president," which means a great deal. Mr. Higginson is a native of Chicago, having been born in that city July 11, 1846. His engineering education was acquired in Lawrence Scientific School at Cambridge, Mass. He entered railway work in 1867 with the Burlington & Missouri River railroad in Iowa where he remained two years, being occupied in both office and field work. In 1869 he was promoted to the position of assistant master mechanic of the same road and during the years of 1873-74 was assistant to the master mechanic of the Chicago, Burlington & Quincy, consolidated. In 1875 he became assistant to the receiver of the Toledo, Peoria & Western, going back to the Burlington in 1876 as purchasing and supply agent which position he held three years. From 1879 to 1889 he was assistant auditor of the same system in charge of statistics and special work relating to character and amount of material handled on the road. Since 1890 to the present time he has been assistant to the second vice president. Mr. Higginson is also an expert geologist, and is president of the Chicago Academy of Sciences, in Chicago. He has done considerable writing on the subject of coal burning, of which he has made special study. By those who know him, Mr. Higginson is considered one of the most thoroughly posted railway men in the country, having been engaged in all lines of work. As a master of detail he is unsurpassed. Mr. Ripley is to be congratulated on his acquisition of so able an assistant. The appointment is effective April 10.

In addition to the changes on the Grand Trunk already mentioned, the following are announced by official circulars: Mr. W. J. Spicer, having tendered his resignation as the general manager of the companies comprising the Grand Trunk system, that office will be abolished and the duties assumed by Mr. C. M. Hays, effective April 1, 1896. All communications and reports heretofore addressed to the general manager at Detroit should, on and after the date named, be forwarded to that office at Montreal. Mr. W. E. Davis, general passenger and ticket agent of the Grand Trunk lines west of the St. Clair river, is hereby appointed general passenger and ticket agent of the entire system of the Grand Trunk Railway, with headquarters at Montreal. Assistant general passenger agents and district passenger agents will report to Mr. Davis direct. Mr. Geo. T. Bell is appointed assistant general passenger and ticket agent, with headquarters at Montreal, while Mr. Hughes is appointed assistant general passenger and ticket agent, with headquarters at Chicago, and will have charge of passenger matters of the Grand Trunk Railway lines in the states of Illinois, Indiana and Michigan. Mr. Hughes will continue to have charge of the city ticket office in Chicago. Also taking effect April 1, 1896, the territory of Mr. John W. Loud, general freight agent, is extended to include the Grand Trunk lines west of the St. Clair and Detroit rivers. Mr. David Brown is appointed first assistant general freight agent, with headquarters at Chicago, in charge of all freight matters in connection with the Grand Trunk lines west of the Detroit and St. Clair rivers. Mr. A. H. Harris is appointed division freight agent, with headquarters at Montreal, in charge of the territory east of, but not including, Belleville. Mr. Arthur White is appointed division freight agent, with headquarters at Toronto, having jurisdiction over the territory west of Belleville inclusive, to Georgetown inclusive, and lines north thereof. Mr. R. Quinn is appointed division freight agent, with headquarters at Hamilton, having jurisdiction over the territory from Limehouse to Pt. Edward, and lines north and south, including the Toronto branch and Mimico Station, vice Mr. John Earls, who, being entitled to superannuation, has retired. Mr. H. W. Walker is appointed general auditor, and will continue to perform the duties hitherto assigned to the

chief accountant. Headquarters at Montreal. Mr. N. J. Powers, general passenger agent, who was superseded by Mr. Davis, of Chicago, has been appointed auditor of disbursements, a new position apparently created for him.

## RAILWAY NEWS.

**Choctaw, Oklahoma & Gulf.**—Details of the plan of readjustment of the Choctaw, Oklahoma & Gulf have been made public, and the following is abstracted from the Commercial and Financial Chronicle: "It is proposed to issue 80,000 shares of 5 per cent preferred stock, each share for \$50, or \$4,000,000 in all, as follows: To retire \$1,200,000 general mortgage bonds, 38,400 shares; to retire \$1,100,000 incomes, 12,100 shares; for \$650,000 cash, 29,500 shares; total, 80,000 shares. The bondholders therefore are asked to surrender their bonds and the stockholders are offered the privilege of subscribing to the new stock. The general mortgage bonds surrendered will be held in the treasury of the company and only used for future extensions of its railroad, and will not be issued at a rate in excess of \$15,000 per mile for every mile of road to be constructed. The income mortgage bonds will be canceled and the \$650,000 cash will be appropriated to the extinguishment of \$308,000 car trusts; extension of road from Wister Junction to a connection with the Kansas City, Pittsburgh & Gulf R. to cost \$150,000; and \$192,000 for additions and betterments to the present line. The obligatory charges will be reduced from \$325,000 to \$210,000. The plan sets forth that the net earnings of the road for the first four months of its operation as a completed system are at the rate of over \$315,000 per annum. The sale of preferred stock, it is said, has been underwritten on the condition that the bondholders assent to the plan, as many, it is reported, have already done. The object of the readjustment is unofficially stated to be to enable the company to carry out the plan for building a line south to connect with the Southern Pacific system in Texas, and thus to secure an independent outlet for its coal, now passing over the Missouri, Kansas & Texas R., which company, it is claimed, makes about \$300,000 a year out of the freight given them by the Choctaw Co. The present consolidated mortgage of the Choctaw R. is limited in issue and covers all additional mileage and branches which may be built; it is therefore impossible to construct any new road unless a portion of the present bonds is returned to the treasury for that purpose."

**Cincinnati, Jackson & Mackinaw.**—It is reported that the construction gangs of the contractors on the Cincinnati, Jackson & Mackinaw extension have been making hay at a rapid rate while the sun shone during the past week. Track layers are at work, and the present indications are that the line will be opened for freight traffic within three weeks. Superintendent Flanders has moved his headquarters temporarily to Addison, Mich., where he is able to personally superintend the work. This extension will open a valuable new territory to the C., J. & M. R., and give it several more important connections.

**Florida East Coast.**—The Florida East Coast R. extension is completed as far south as Little Arch creek, which stream is just 4 miles north of Lemon City, and at the present rate of construction it is expected to reach the latter place within a few days. The roadbed is entirely completed, and to lay the ties will take but a short time. It is expected that the road will reach Miami early in April, and that trains will be put on immediately. So soon as the trains shall begin running the work at Miami will begin in earnest. As it is now the transportation facilities are so uncertain that the material cannot be moved fast enough. A bridge will be built over Miami river, and a track will be laid for a half mile south of Miami. This will be done to accommodate the truckers on the south side of the Miami. An extension of the road to point still further south is probable. This will be for the benefit of the truckers in the Coconut Grove district.

**Frederick & Pennsylvania.**—This road, which extends from Frederick, Md., north to Kingsdale, on the Pennsylvania State Line, and which is operated under lease by Pennsylvania R., is to be sold at Frederick on June 9. The property will undoubtedly be purchased at the sale by the Pennsylvania, and there is some talk of the line being extended toward Washington, D. C. The line is 28 miles long and at the northern terminus connects with a branch of the Pennsylvania which extends to York. All the rolling stock used by the road is furnished by the Pennsylvania.

**Houston East & West Texas.**—Reports from Houston, Tex., state that the much talked of sale of the Houston East & West Texas has at last transpired, but details of the sale are meager. The purchase of the line has been credited to the Santa Fe, the Southern Pacific and also to the Queen & Crescent, but it is now thought to be a banking institution in New York City. It is to be operated as an independent line, having what traffic arrangements it may make with its connections. The bank that is making the purchase is said to hold a large amount of the bonds of the road, enough to make it to its interest to protect the property and enough to give it easy control when desired to exercise it. The only thing that can cause the deal to fail would be the discovery of a mistake or misrepresentation in the valuation of the road between now and the time fixed for the transfer. The new owners, unless some unforeseen circumstance occurs to prevent, will take charge of the property about June 1.

**Humeston & Shenandoah.**—This road, which was recently sold under foreclosure proceedings, now has its headquarters at Burlington, Iowa. It has been reincorporated with a distinctly local body of incorporators. The purpose of the corporation, as set forth, is to purchase, build, maintain and operate a line or lines of railway commencing at Humeston in Wayne county, and extending thence through Wayne, Decatur, Ringgold, Taylor and Page counties to the town of Shenandoah in Page, with power to build branches and extensions. The first annual meeting for organization will be held on the first Wednesday after the first Monday in April. This line has been operated as a branch of the Burlington Route for a term of years, and this act of incorporation here, by the parties named, brings the line under the personal and immediate control of the head of the Burlington system. The incorporators

re: Messrs. W. W. Baldwin, J. W. Blythe, H. B. Scott, W. F. McFarland and H. E. Jarvis. Capital stock, \$4,000,000.

**Louisville & Nashville.**—General Traffic Manager Van den Berg, of the Louisville & Nashville, has, according to report, been looking over plans for the improvement of the railroad docks at Pensacola, Florida, with a view to soon beginning work thereon. The secretary of war has granted permission to the company to extend its docks to deeper water, beyond the channel line in the harbor, and the railroad company has appropriated the sum of \$150,000 to begin this work. When completed they will be the most extensive docks on the gulf, having the deepest water, and when the new channel shall be finished over the bar, any vessel that floats will be able to enter the harbor and receive freight direct from the cars.

**Maricopa & Phoenix & Salt River Valley.**—A mortgage has been filed in the office of the county recorder at Phoenix, Ari., conveying to the Farmers' Loan & Trust Co. of New York the 41 miles of trackage, rolling stock, etc., of the Maricopa & Phoenix & Salt River Valley R. Co. This mortgage is placed for the purpose of securing a loan of \$860,000 in 30 year bonds, bearing 5 per cent interest, which mortgage includes the original bonded indebtedness of the road for \$540,000.

**Oregon Short Line & Utah Northern.**—It is stated that all arrangements for the reorganization of the Oregon Short Line & Utah Northern R. have been completed, and that the plan provides for the separation of that line from the Union Pacific and the operation of it as an independent system with headquarters at Salt Lake City. It is hoped that matters will make enough progress to enable the receiver to take charge by July 1. It is thought the receiver will be a Utah or an Omaha man who will be favorable to the Union Pacific, and that there will be but little change in the affairs of the road from the present state. The Union Pacific will continue to enjoy all the privileges it has at present, while it will be relieved from the indebtedness of the Short Line. It is still a question whether or not the new receiver of the Short Line will open the Oregon gateway, thereby letting in the competitors of the Union Pacific for business.

**Philadelphia & Brigantine Beach.**—This is the name under which the old Brigantine Beach R. Co. is hereafter to be known, having been reorganized. The capital stock was fixed at \$300,000, divided into \$150,000 6 per cent preferred cumulative stock and \$150,000 common stock. Geo. H. Cook was elected president; James B. Van Woerts, treasurer, and R. D. A. Parrott, general manager.

**St. Louis, Avoyelles & Southwestern.**—It is said that track-laying on the St. Louis, Avoyelles & Southwestern R. has reached Mansura, 5 miles south of Marksville. A very large force is working day and night, and it was believed the road would be completed to Marksville on contract time. The road is daily lined by large crowds of both sexes, old and young, encouraging the workmen, who are exerting all their strength to finish the work in time. The Simmesport connection is now complete, leaving only one end to be finished. The citizens of Marksville are making preparations to celebrate the completion of this road at that point in a befitting manner.

**Southwestern Arkansas & Indian Territory.**—Mr. Chas. F. Penzel, who was a few weeks ago appointed receiver of the Southwestern Arkansas & Indian Territory road and the Smithton Lumber Co., which operates same, has resigned that position, and has been succeeded by Mr. J. A. Woodson, of Little Rock, Ark. The Smithton Lumber Co. owns about 20,000 acres of agricultural and timber lands, and the railroad company which was organized to reach its lands, has a capital stock of \$1,400,000, of which about \$360,000 has been issued. The railroad now in operation is 34 miles in length from Hebron, Clark county, to Antonio, crossing the St. Louis, Iron Mountain & Southern at Smithton. The grading has been done for some miles on an extension west from Antonio to Murfreesborough.

**Texas & Pacific.**—It is said that the Texas & Pacific is on the eve of making some extensive improvements in its terminal facilities at New Orleans. These improvements will comprise a new passenger station and new tracks. By a recent decision handed down by the supreme court, the Texas & Pacific has absolute control of certain privileges along the river front, of which, heretofore, by injunction and other means, they have been deprived. These additional privileges will be utilized, and the fact that recently Westwego has been admitted to free portage is another encouragement to the company to more fully utilize their privileges at that point.

## NEW ROADS AND PROJECTS.

**California.**—It is reported that a road about 85 miles in length will be built, which will join the terminus of the Pine Lumber Co.'s road with the Donahue line. The most important railroad in Humboldt county, runs south from Eureka for 25 miles and connects with the Pine Lumber Co.'s R., which in turn runs south toward Ukiah 17 miles. This is bonded to San Francisco capitalists who own largely in the Donahue line. The construction of a road to fill this gap would open up a vast and undeveloped territory hitherto unconnected with markets, and would tend to shut off Portland traffic. Portland commercial agents of late have made inroads in Humboldt county on general merchandise and have been receiving large orders for goods.

Material for the construction of the Alameda & San Joaquin road has begun to reach Stockton. Already five cars of the steel have come in from Illinois, and will be taken to the front as soon as needed. The turntable is not in the lot which has arrived, and as that is the first portion which will be used nothing can be done until it arrives. The foundations and the falsework for a portion of the bridge are already in position and the labor of putting the structure together will not be great. It is expected to have the whole 30 miles from the Corral Hollow mines to Stockton graded this month.

**Georgia.**—An organization has been formed under the name of the Augusta Belt to build a road about 3 miles in length as a belt line around the city of Augusta, Ga. The

Georgia Railroad and other lines entering Augusta are said to be interested in the construction of the line, and Messrs. Charles Estes, and C. V. Walker and others are the incorporators.

**Michigan.**—A deal is said to have been consummated whereby the General Electric Co., of Chicago, will secure one of the longest electric lines in use at the present time. This company, which owns plants at Kalamazoo, Battle Creek and Lansing, Mich., proposes to connect these three towns, making a line some 75 miles in length. It is also said that some additional line will be built.

**Missouri.**—A charter has been issued by the secretary of the state of Missouri to the Central R. of St. Joseph. The organization proposes to build a line of railroad from the southern limits of St. Joseph through the counties of Buchanan, Andrew, De Kalb, Gentry, Davis, Harrison and Grundy to the city of Trenton, a distance of 90 miles. The stockholders are all residents of St. Joseph, among whom are Sas. W. Boyd, J. W. Brackett, John A. Duncan, W. B. Johnson, Addie A. Rush, John Townsend, J. L. Bittinger, John F. Tyler, R. H. Faucett and S. H. Sommer. Capital stock, \$900,000.

**New York.**—A letter from New York states that the Seneca County R., which is projected to run from Geneva to Seneca Falls—10 miles—has been surveyed from Geneva to Waterloo—4½ miles, and surveys are now in progress on the remainder of the line. About 300 men are now at work and it is expected to complete the line by July 1. Mr. J. F. Dolan, of Elizabeth, N. J., has the contract for the construction work, and he is also president of the company. The work is quite light, with maximum grades of one half of 1 per cent, and a maximum curvature of 8½ deg. The work is being very substantially done and the track is to be laid with 80 lb. rails. It will be equipped with first-class rolling stock and will do a regular freight and passenger business. Mr. S. G. Gano, of Geneva, N. Y., is chief engineer.

**Ohio.**—An effort is being made, it is said, to build a railroad from Fremont to Wauseon. The proposed route extends through Gibsonburg and Bowling Green. It would tap some of the richest oil country in the state, and form a cut-off from the Lake Shore between Chicago and Buffalo, leaving Toledo to the north. R. H. Black of Gibsonburg and a number of wealthy oil men are supposed to be behind the scheme.

**Pennsylvania.**—A corps of engineers is making a survey for a branch line for the Pittsburgh, Cleveland & Toledo road, to be built from New Castle, Pa., to Toledo. The engineers have been busy for the past two weeks on this branch which is from the mouth of the Beaver river to a point north of Beaver Falls, and are laying out a line on both sides of the river. It is said that the road will certainly be built, but on which side of the river it will be located has not yet been decided.

**Texas.**—Two routes have been surveyed for the Aransas Harbor & Northern R. which is to be built from Aransas Pass on the coast to Smithville—a distance of 156 miles—and as soon as one is decided upon construction will begin. At Smithville the proposed northern terminus, a connection will be made with the Missouri Kansas & Texas. The road is projected by the company which is developing the deep water harbor on Aransas Bay. C. H. Sawyer is vice-president and general manager, and W. D. Jenkins, of Aransas Pass, Tex., is chief engineer.

## INDUSTRIAL NOTES.

### Cars and Locomotives.

—The Pennsylvania has let contract for 100 "G G" hopper bottom cars to the Wells-French Co., Chicago.

—The United States Car Co. is now overhauling and putting in order the machinery in its shops at New Decatur, Ala., preparatory to resuming operations. When in full operation this plant requires 500 men.

—The Elliott Car Works, of Gadsden, Ala., is reported to have secured the contract for 500 cars wanted by the Seaboard Air Line.

—The J. G. Brill Co., of Philadelphia, Pa., is filling an order for 26 cars for an electric railway in Cape Town, Africa.

—The order received by the United States Car Co. for 500 cars from the Wheeling & Lake Erie road will operate that plant to its full capacity for some time.

—The notice published last week that the Springfield Malleable Iron Company was to retire from the coupler business, although apparently well vouched for, is emphatically denied by the company. It writes that it will continue to manufacture the Ludlow automatic coupler as heretofore, and also the Miner and Bryan draft riggings.

—The plans and specifications of the new gondola cars for the Lehigh Valley road, noted in our issue of March 14, call for metallic brake beam, M. C. B. coupler, with Graham attachments; truck spring (Lehigh Valley standard), to be made by Pickering, A. French & Co., or Lehigh Valley Spring Works; turnbuckles, made by Cleveland City Forge Co.; trucks made by Fox Pressed Steel Co.; center plates, top and bottom, pressed steel, made by same firm; journal boxes, Davis' latest pattern. If builders do not make their own wheels, wheels made by Cayuta Wheel & Foundry Co., of Sayre, Pa., or by McKee, Fuller & Co., Fullerton, Pa. The pattern is the King-Hopper gondola coal car, 60,000 pounds capacity.

—Supplementing the notice made last week regarding the Schoen Pressed Steel Co. as purchasers of the plant of the Schoen Manufacturing Co., it should be said that the company has also bought five and one-half acres of land adjoining the plant, extending from the line of the Pittsburgh, Fort Wayne & Chicago Railway to the river front. The plant is located in the lower part of Allegheny, and in addition to the Pittsburgh, Fort Wayne & Chicago Railway, the Baltimore & Ohio Railroad runs into the plant of the company. The plant now has a capacity for building 135 truck frames per day, and with improvements to be made this will be increased to 300 per day. The company are now manufacturing their pressed steel car bolsters and other patented specialties to the extent of from 50 to 75 tons per day. This tonnage will probably be doubled by the in-

creased business due to the introduction of their pressed steel truck frames. This truck frame is said to be a structure cheap in first cost, as compared with any truck frame now in the market, and possesses great strength and many meritorious points due to its ingenious construction. A handsomely illustrated catalog descriptive of the truck frame has just been issued by the company.

### Bridges.

—Work has been resumed on the railroad bridge across the Missouri river at Yankton, S. D. The bridge will be completed this season. The cost of the structure will be \$600,000, and will be bonded to an English syndicate. The bridge will be operated by the Great Northern road.

—The bridge committee of Media, Pa., composed of J. B. Rhoades, W. P. Lukens and F. S. Vernon, has reported in favor of constructing a bridge over Chester creek, at Ninth street; estimated cost, \$30,000.

—The West Morgantown Suspension Bridge Co., Morgantown, W. Va., will build a bridge, 600 ft. long, of steel and iron wire cables, etc., to cost about \$6,000.

—Application has been made for a charter for a company that proposes to construct an iron bridge across the Brazos river at Pitts Ferry, Tex.; incorporators, Wm. Koppe, H. Rhode and others.

—Mr. Albert H. Scherzer, 1044-48 Unity building, Chicago, now controls the patents on the rolling lift bridge invented by the late Mr. Wm. Scherzer, C. E., of Chicago. Two Scherzer bridges are now in successful operation at Chicago. These have both been illustrated in the RAILWAY REVIEW. A third bridge of this type is now being built for the city of Chicago across the Chicago river at North Halsted street, the contract for the substructure having been recently awarded. It is estimated that the cost of his type of bridge will be about the same as that of an ordinary swing bridge of the same capacity. Its advantage in leaving the channel entirely unobstructed for its full width appears likely to lead to its general adoption in place of the center pier bridge for all openings of moderate width.

—The idea of a temporary bridge at Gardner, Me., has been abandoned, and letters containing specifications and asking for bids for the construction of a permanent steel iron bridge sent to all bridge manufacturing companies, the replies to be opened April 11, in the city council rooms. The bids will be considered and work will be immediately begun on the bridge so that at the latest it will be completed by the first of August.

—The temporary bridge at Fairfield, Me., has been completed and teams are going across it. A representative of the Boston Bridge Co. was in Fairfield Saturday in consultation with the selectmen and the committee appointed to act with them in regard to the matter of a bridge, and a contract was made with the Boston Bridge Co. to put up a steel bridge similar to the one put in last summer. The contracts will be let for building the piers and abutments as early as possible, and the work will be commenced at once and pushed as fast as possible till all is completed. E. J. Lawrence, S. A. Nye and A. F. Gerald have been appointed a committee to make arrangements.

—At the annual town meeting, Kennebunkport, Me., it was voted to leave the matter of rebuilding and repairing the bridges, namely, Bartlett's, Clay Hill, the Port drawbridge and the Mousam river bridge—entirely to the discretion of the municipal officers. The bridge at Bartlett's Mills will be of iron and the contract has been let to the Boston Bridge Co. The chief expense will be the Port drawbridge, which the people of Kennebunkport are strongly in favor of replacing by a more durable and of course more expensive iron and steel rail drawbridge. It was stated that a new wooden bridge similar to the other would cost nearly \$1,200; a stone bridge about \$3,500, and a durable iron and steel construction with modern improvements, between \$5,000 and \$6,000. Two-thirds of the expense is borne by Kennebunkport.

—It is proposed to build a highway and electric railway bridge over the Missouri river at St. Charles. If the bill that is now before both houses of congress passes a company will be organized at once and the work pushed to completion.

—The project of a bridge over the Hudson river at St. Anthony's Nose, abandoned some time ago, has now been taken up by a new company under whose auspices the work is now being prosecuted. The bridge is to be chiefly for railroad trains. There will be a pathway for passengers, but no wagon road.

—The Detroit & Mackinac Railroad Co. is reported as about to petition for permission to build two steel span bridges over the Kawkawlin river.

—There is to be an iron bridge built across the Sebastcook on the Belfast branch of the Maine Central Railroad, in place of the wooden bridge. The new bridge will be built as soon as possible this spring.

—It is proposed to build a 160-ft. steel draw span bridge over Little Lake Butte des Morts, at Menasha, Wis. There will also be 3,050 lin. ft. of pile approaches. Estimated cost, \$18,200. No appropriations have yet been made.

—The Duluth, Mesaba & Northern has awarded the contract for furnishing the steel for a 102 ft. plate girder span across the St. Louis river to the Carnegie Steel Co., at a cost of about \$16,000.

—According to Mr. E. L. Corthell work on the proposed railroad bridge across the Mississippi river near New Orleans will begin this year. This bridge will be one of the largest in the world, and plans for it have been prepared by the Phoenix Bridge Co., Phoenixville, Pa., the reported contractors for it. It is understood that both the Southern Pacific and the New Orleans & Western Companies may use it when completed.

—The contract for the building of the iron and steel bridge over the Tar river at Tarboro, N. C., of which mention has already been made in these columns (page 153, March 14), has been awarded to the King Bridge Co., at \$14,950. The contract calls for a first class bridge, 510 ft.

\* of which is to be of steel, 30 ft. of earth abutments at each end, a driveway 18 ft. wide, two sidewalks on either side of 4 ft. each, and six large lamps. All to be of steel, except floor, which will be of wood on steel stringers.

—At a meeting of the shareholders of the Brockville & New York Bridge Co., which holds the charter from the Dominion government for the erection of an international bridge across the St. Lawrence at Brockville, Ont., held March 23, the agreement of amalgamation with the St. Lawrence Railway Co., of New York, which holds the international bridge charter from congress, was ratified. The capital stock of the two companies in all is \$2,600,000, of which \$214,000 has been subscribed and \$21,400 paid up. Messrs. Charles McDonald, Joseph S. Decker, Wayne Griswold and Clarke R. Greggs, of New York; and Charles J. Pusey, Wilmet P. Cole, Daniel W. Downey, G. A. Weatherhold and L. B. Howland, of Brockville, constitute the first board of directors of the new company. Several abutments for the bridge were built last season on the Sister Islands midway between Brockville and Morristown, N. Y. The amalgamated companies intend pushing the construction of the bridge during the approaching summer on a much larger scale than heretofore attempted.

—The county commissioners of Mahoning county, Ohio, have petitioned the legislature for permission to build two iron bridges over the Mahoning river at Youngstown. Estimated cost, \$200,000.

#### Buildings.

—There is not another railroad station in the world like that at Bemis, Me. It is to be built entirely of logs from the woods in that vicinity. The main building is 20x40 ft., fronting on the railway tracks. This will be finished in the rough log style on the inside, all in one room, with a ticket office in the bay in front. The rafters will show up in the roof in true log cabin style. At each end of the main room will be a big open fireplace for burning wood.

—It is reported that negotiations have been closed for the location of a steel manufacturing plant at Coraopolis, Pa. The site has been decided upon and building operations will be commenced in the near future.

—It is stated that Senator Calvin S. Brice and the Ohio Southern Railroad will establish a plant in Springfield, O., for the manufacture of coke from Pennsylvania coal. The report states that about \$500,000 will be invested in the plant and 100 ovens built.

—The Dauphin Car Works, at Dauphin, Pa., has been purchased by Philadelphia parties, who are making extensive alterations, at a cost of \$50,000. The parties intend turning it into a structural iron and steel plant.

—A bill providing for the erection of a large union depot at Nashville, Tenn., will probably be introduced in the next session of the city council. Address the mayor.

—Work has been begun upon the rolling plant of the Block-Pollock Company at Carthage, near Cincinnati. This company has purchased 19 acres of land lying just west of Mill Creek and opposite the Hess Axle & Spring Works. The plant will be of great capacity and give employment to 1,000 men. The C. H. & D. Railroad will lay one main switch and four sidetracks to the works for the accommodation of its business.

—The new Concord & Montreal shops to be built by the Boston & Maine Railroad at Concord, N. H., will occupy 28 acres of land. The buildings will take up five acres and will include a boiler and erecting shop 410x70 ft., two machine shops 305x305x30 ft., a blacksmith shops 60x150 ft., a storehouse and offices 150x40 ft., a lumber shop 300x400 ft., a dry house 75x25 ft., a woodwork shop 300x60 ft., a power and boiler shop 85x60 ft., a cabinet, pattern and tin shop 200x40 ft., a passenger repair shop 163x170 ft., a freight repair shop 162x170 ft., and a paint shop 238x50 ft.

—Plans are now being prepared for a machine shop to cost \$60,000 to be built by the government at Port Royal, S. C., for construction work and repairing slight injuries to vessels.

—The Grey Iron Casting Co., of Mt. Joy, Pa., is erecting a new plant, to include a foundry building, 150x60 ft., machine shop, 100x40 ft., and a warehouse 100x33 ft. When the new plant is in operation it is expected that the output of the company will be doubled.

—It is announced that a large car factory, to be known as the Union Car Works, and to be run on the co-operative plan, will be put into operation in North St. Louis during the coming summer. Sixteen acres of ground were purchased in Baden, between the Burlington and Wabash tracks, and the work of building the shops will be pushed as rapidly as possible.

—Plans have been drawn for a mammoth car house to be built by the Cleveland Electric Street Railway Co. It will be 520x120 ft. of steel and brick, with slate roof. Its capacity will be 180 cars.

—McIntosh, Hemphill & Co., Pittsburgh, has purchased a tract on the Allegheny Valley Railroad and next week will break ground for a new plant which will turn out a patent cold-rolled steel car truck. It is stated that New York capital is interested and that Newton A. Hemphill, of the firm of McIntosh & Hemphill, is to manage the undertaking. Steel car trucks of a new pattern will be manufactured and much patented machinery will be necessary to do the work. The work of erecting the buildings will be started immediately, and the orders for the machinery have already been let. It is expected that the establishment will employ 600 men. The buildings will be of steel and will be equipped with all the latest appliances, electric cranes, electric lights and power machines, and will cost, it is estimated, about \$300,000.

—R. Hoe & Co. of New York City, manufacturers of printing presses, have placed an order with the Berlin Iron Bridge Co. of East Berlin, Conn., for an all steel building for storage purposes. It will be 40 ft. wide and 60 ft. long, three stories high and fire proof. To avoid condensation of moisture, the roof and sides are lined with the Berlin Co.'s patent anti-condensation fire proof lining on the under side of the corrugated iron covering. The floors are concrete, supported by corrugated iron arches resting on I beams. A traveling crane is attached to the trusses, having a capacity of three tons, and so arranged that it takes the material to be raised in the building from

the lower floor and raises it to any part of the building on any of the floors. It is a very conveniently arranged and compact storehouse.

—The smelting department of the copper works of the Pennsylvania Smelting Co. at Natrona, Pa., was destroyed by fire on March 21. The loss is estimated at \$1,000,000. The buildings destroyed covered nearly four acres of ground. The output of the plant was about 100,000 ozs. of silver and 3,000,000 lbs. of copper a month. The fire started by the blowing out of a furnace, the hot metal igniting with some waste near the mouth. The flames spread rapidly and in a short time the furnaces and buildings were a mass of flames. The costly machinery and mechanical appliances were destroyed and sixteen furnaces and fifty tanks were ruined. The buildings were ruined and will have to be rebuilt. A number of loaded freight cars standing on a siding adjoining the works were consumed. It is believed that the insurance will about cover the loss. The insurance was mostly placed in Philadelphia companies. This concern is one of the most substantial corporations in Pennsylvania, and is controlled by eastern capital principally.

#### Iron and Steel.

—The Waterbury (Conn.) Machine Co. has bought the patents for the United States of the Bolton continuous wire drawing machinery. Until now these machines have been imported from England. The company expects to improve the machines and also adapt them for drawing wire of larger gages than has heretofore been done by the multiple die system.

—Negotiations are under way for the starting up of the the Columbia Iron & Steel Co.'s plant at Uniontown, Pa., in the next few months. New York capital is figuring on refitting and improving the property.

—The new double furnace of the Cleveland Cliffs Co. at Ishpeming, Mich., was put in blast last week. The furnace is the largest in the country using charcoal, and will daily burn the wood from six acres of forests. Ten thousand acres of forests have been bought for the purpose.

—The Tennessee Coal, Iron & Railway Co. (office, Birmingham, Ala.) has purchased 400 acres of iron ore lands near Childersburg and will develop same at once, taking out from 200 to 400 tons daily. It is stated that this ore is to be used in steel making by the company.

—The Edgar Thompson Steel Works of Braddock has just completed rolling a 5,000 ton order for the Pennsylvania Railroad of 60 foot rails 100 pounds to the yard. These are said to be the heaviest rails ever rolled.

—The plant at the Altoona Iron Co., Altoona, Pa., manufacturers of bar, band and nut iron, has been put in full operation, the company having received a number of good sized orders.

#### Machinery and Tools.

—The Rand Drill Co., 1328 Monadnock block reports that the demand for air compressors continues, they having received orders for four within the last few days.

—The M. T. Davidson Steam Pump Co. of New York, is executing a contract for the Baltimore & Cantonville Railroad Co. for four vertical Davidson twin air pumps of 25 in. air cylinders, ten 14 in. pressure pumps, and three small pumping engines. They are also building the air pumps for the United States cruiser Chicago, and are equipping two torpedo boats.

—Watson & Stillman have for some little time been at work upon a lot of hydraulic machinery for the new American Pulley Works of Philadelphia, which is to manufacture a new all-sheet steel pulley, in which the hub, spokes and rims are all made of thin sheet steel.

—The Davis & Egan Machine Tool Co. of Cincinnati, O., has completely stocked its new store, No. 170 Liberty street, New York City, with a full line of machine tools. This company lately secured from its agent in Brazil one of the largest orders ever received from South America, amounting to over \$10,000. One of the machines alone will require two freight cars to transport it from the works to New York, from which point it will be shipped to Brazil.

—The King Bridge Co., of Cleveland, has closed a contract with the Pittsburgh & Conneaut Dock Co. to enlarge its plant at Conneaut. Four of the King hoisting and conveying machines for loading ore and coal have been contracted for and will be completed June 1.

—McIntosh, Seymour & Co., Auburn, N. Y., are building for the Columbia & Maryland Ry. Co. eight engines of 1,000 horse power each; they will be direct coupled to 700 K. W. Westinghouse generators. They are also building a 700 h. p. three-cylinder, three-crank vertical engine to be direct coupled to two 200 K. W. dynamos, this engine is for Buenos Ayres, Argentine Republic. A large number of orders for high speed engines have also been received since the first of the year.

—The Westinghouse Machine Co.'s orders for March include three vertical cross-compound engines, each 1,600 h. p., for the Allegheny County Light Co. station, Pittsburgh, Pa.

—The Babcock & Wilcox Co. has taken an important contract for boilers, aggregating 7,000 horse power, to be used for furnishing power to the electric equipment of the Northwestern Elevated Railroad.

—The firm of C. H. Baush & Sons of Holyoke, who for the past twelve years has been manufacturing radial drills, vertical boring, milling machinery and iron work for buildings, will be converted into a stock company, under the title of the Baush & Harris Machine Tool Co. The works will be moved to Springfield, Mass., and as soon as a suitable location can be found the company will begin the erection of a building which will include machine shop and a foundry. William A. Harris of Springfield is one of the prime movers in the new organization, and he and the Messrs. Baush will control practically all the stock in the company. Mr. Harris was for twelve years secretary of the Springfield Foundry Co. and for the past few years has been associated with the Pratt & Cady Co. His address will be Holyoke, Mass., pending the erection of the new plant at Springfield, which it is hoped will be ready near the middle of July. The new company will probably organize with Mr. Harris as president and W. H. Baush secretary, treasurer and business manager. In addition to

what is now manufactured by the Baush Co., the new company will make iron and brass castings.

—Dietz, Schumacher & Co., of Cincinnati, has completed several new machines of which they are justly proud. One is an 18 in. tool room lathe, with a 3 in spindle, with a 1 1/16 in. hole through the center, and a 26 in. extra heavy lathe, with a 4 3/4 in spindle and a 2 1/4 in. hole through the center. These are the first they have built of this pattern. One of each will be shipped to New York and Chicago.

—J. E. Gadsey, Abbeville, S. C., wants to correspond with manufacturers of compressed air machinery.

—The contract for reducing the 1 per cent grades on the Chicago division of the Chicago Great Western Railway at Holcomb, Esmond, German Valley and South Freeport, has been let to Haloorson, Richards & Co., of Minneapolis. It will take about 400,000 cubic yards of earth and 25,000 cubic yard rock excavation to make this improvement which when completed will increase the hauling capacity of locomotives over this division 40 per centum.

In addition to the compresses and warehouses already erected at Port Chalmette, La., the terminus of the New Orleans & Western, a dispatch from New Orleans states that the largest compress in the world is to be placed at that point. It will be a 4,000-ton press, of a capacity to handle 2200 bales of cotton daily. It will give a bale density of 55 lbs. per cubic foot—a remarkable pressure. It is being built by De LaVergne & Co., and is to be ready for work by May 1. In addition to this, work is about to begin on a large hotel, several more warehouses and an extension to the wharf.

—The interlocking plant just completed at Riverdale, Illinois, by the Union Switch & Signal Co. was put into service Sunday, March 29 at noon. This plant is at the crossing of the Illinois Central, the Pittsburgh, Cincinnati, Chicago & St. Louis and the Chicago & Calumet Terminal Railways, and has one of the largest interlocking machines in the vicinity of Chicago. There are 69 working levers and 51 spare spaces which will admit of providing for a large number of additions to the tracks and switches. The frame is for 120 levers. There are 19 levers for 25 switches, 4 locks and 2 movable point frogs. Seventeen levers are for 29 facing point locks and 6 crossing bars. Thirty levers work the same number of signals as well as 10 bolt locks and three levers are used for the locks and couplers of the drawbridge on the Illinois Central Railroad over the Calumet river. The plant is pretty well scattered about the crossing and is complicated by the drawbridge and the switching connections between the Illinois Central and the Chicago & Calumet Terminal. No selectors are used and the locking is arranged so that the advance signals all precede the home signals. The tower is at the northwest angle between the Illinois Central and the Pittsburgh, Cincinnati, Chicago & St. Louis and is 15x60 ft. in size. The plant passed a rigid inspection by the signal engineers of the different roads and also by the consulting engineer of the railroad and warehouse commission without adverse criticism.

#### Miscellaneous.

—The board of directors of the Westinghouse Machine Co. of Pittsburgh, have declared a quarterly dividend of 1 1/2 per cent on the preferred and common capital stock of the company, payable on April 10.

—The manufacturers of the Leach sanding apparatus for locomotives announce that they now have a working model, similar to those heretofore furnished air brake instruction cars for educational purposes, which has been designed expressly to meet the demand from engineers' and firemen's clubs and lodges. These will not be given away, but will be sold at a nominal price, found necessary for their own protection. Full particulars may be obtained from Henry L. Leach, Cambridge, Mass.

—The shops of the Pennsylvania Railroad Co., at Altoona, Pa., have been placed on a working basis of nine hours for five days a week and eight hours for Saturday.

—In these days of strikes, lockouts and boycotts it is interesting to note that the Brown & Sharpe Mfg. Co., Providence, R. I., has never experienced any trouble with its employes since it began business in 1872. Last Tuesday night a dinner was given, in which 32 men who have been in the Brown & Sharpe Mfg. Co. for 25 years or more sat down to the table. A club to be known as the Brown & Sharpe Quarter Century Club was formed, and a president, secretary and treasurer elected. The members of the club represent every department of the shop from the superintendent down. As other men complete the term of 25 years during which they have worked for Brown & Sharpe they will be admitted to the club. There were those at the table who had seen 30, 35 and 40 years of service with the firm.

—It is stated that the Dismal Swamp Canal Co., of Baltimore, has let the contract for reconstructing this canal to Patrick McManus, 505 Betz building, Philadelphia. The contract covers the construction of a completed canal ready for business, with locks, dams, approaches, waste weirs, all necessary excavation, clearing, ditching, bridging, drains, wooden culverts and conduits. This work will extend over the whole route of the canal from a place on the Elizabeth, four miles from Norfolk, Va., to a place where the canal meets the Pasquotank river, near South Mills, N. C. There are to be ten "turnouts" provided. Each turnout is to be 20 ft. wide on the bottom and at least 200 ft. long, curving out at each end to make uniform connection with the banks. A feeder about three miles long is to be constructed to Lake Drummond. The total length of the canal is about 22 miles, the average width 60 ft. and the depth 10 ft.

—Officials of the Panhandle have received a proposition from Logansport, Ind., looking to a large extension of the company's shops at that point. The city proposes to give a large tract of land to the company on condition that all the departments of the shops be increased to meet modern demands, also that new shops be erected for the manufacture of cars and car wheels. The proposition has been taken under advisement.

—The St. Louis, Oklahoma & Texas Air Line Railway wants to purchase 275 tons of T steel rails, second-hand, for relaying, and 25 tons of spikes and joints. Address, D. Griffin Gunn, president, Tecumseh, O. T.